ENHANCED MITIGATION

Mission Area Operations Plan
2024-2029

Ensuring a safe and secure homeland for all North Dakotans

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January 31, 2024

Nancy Dragani, Regional Administrator
Federal Emergency Management Agency
Region VIII
Denver Federal Center
Building 710, Box 25267
Denver, CO 80225-0267

Dear Ms. Dragani:

On behalf of the State Hazard Mitigation Team (SHMT), we would like to extend our gratitude for the unwavering support provided by your staff as more than 80 public and private partners collaborated on development of the 2024-2029 State of North Dakota Enhanced Mitigation Mission Area Operations Plan (2024-2029 Enhanced Mitigation MAOP).

The SHMT and the 2024-2029 Enhanced Mitigation MAOP embody Team ND's cultural aspirations to work as one; be citizen focused; have a growth mindset; make a difference; and exhibit leadership everywhere. All these aspirations have teamwork as a center of gravity. For the past three decades, the SHMT members faithfully executed mitigation strategies to build a more resilient North Dakota. Their achievements set the foundation of the 2024-2029 Enhanced Mitigation MAOP.

The 2024-2029 Enhanced Mitigation MAOP meets and exceeds the requirements of the Disaster Mitigation Act of 2000 (DMA2K), Section 322, ensuring the State of North Dakota's eligibility to receive federal disaster mitigation funds. The DMA2K requires states to develop a mitigation plan that describes the processes for identifying hazards, risks and vulnerabilities; developing and prioritizing mitigation actions; encouraging the development of local and tribal mitigation plans; and providing technical support for these efforts. As determined by your Region VIII staff, the 2024-2029 Enhanced Mitigation MAOP meets requirements outlined in 44 Code of Federal Regulations (44 CFR) 201.4 for Standard State Mitigation Plans and 201.5 for Enhanced State Mitigation Plans.

The State of North Dakota assures it will continue to comply with all applicable federal and state regulations in effect with respect to the periods for which it receives grant funding, in compliance with 44 CFR, Part 13(c). The State will amend the plan whenever necessary to reflect changes in the state or federal laws and statutes as required in 44 CFR, Part 13.11(d). The adoption of this plan demonstrates the State of North Dakota's commitment to fulfilling the mitigation strategies outlined in the plan and authorizes the responsible agencies and organizations identified in the plan to execute their responsibilities.

With the submission of the 2024-2029 Enhanced Mitigation MAOP, the plan is hereby adopted by the State of North Dakota under the executive powers of the governor. We look forward to future collaboration as we strive to build the most disaster resilient state in the nation.

Sincerely,

Doug Burgum
Governor

CC: MG Alan Dohrmann, Director, North Dakota Department of Emergency Services
Darin Hanson, Director, North Dakota Division of Homeland Security
Justin Messner, Disaster Recovery Chief, North Dakota Division of Homeland Security
Logan Sand, Senior Community Planner, Federal Emergency Management Agency

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ES Executive Summary

ES.1 Developing the Plan

The North Dakota Department of Emergency Services Homeland Security Division (NDDES-HLS), as lead agency for development of the 2024-2029 Enhanced Mitigation Mission Area Operations Plan, expresses its gratitude to the State Hazard Mitigation Team (SHMT) for making a positive difference in the resiliency of our communities.

As stated in *North Dakota's Collaborative Approach to Hazard Mitigation: Progress Report January 2019-2020,* "The SHMT truly embraces Governor Doug Burgum's cultural aspirations for Team ND: work as one; citizen focused; growth mindset; make a difference; and leadership everywhere. All these aspirations have teamwork as a center of gravity. The SHMT excels at teamwork, no matter the agency or organization the members represent."

The 2024-2029 Enhanced Mitigation Mission Area Operations Plan reflects the strong partnerships required to achieve a more disaster resilient North Dakota. This plan builds on the successful mitigation strategy already in place by the 106 public and private partners who comprise the SHMT. As Governor Burgum has said, "The saving grace for the frequency and intensity of disasters in North Dakota is the effectiveness of the mitigation program."

During the past five years, the NDDES-HLS produced annual progress reports that tell the story of how the strategy has been effective in North Dakota. SHMT members faithfully executed mitigation actions, sometimes making revisions to the scope of actions to account for changing operating environments, funding opportunities, and new directives. Their achievements set the foundation for this plan.

Formal development of the 2024-2029 Enhanced Mitigation Mission Area Operations Plan (Enhanced Mitigation MAOP) began in January with NDDES-HLS selecting and meeting with its consultant. Together, they presented an updated strategy to the Technical Advisory Committee (TAC), tasked with oversight for the plan. The TAC refined the strategy establishing the priority to maintain the plan's enhanced status and meet the new hazard mitigation planning guidance requirements outlined by FEMA in the *State Mitigation Planning Policy Guide* that went into effect in April 2023. The new plan requirements include an emphasis on climate change, and the correlation of the impacts on the identified hazards and threats in the state while promoting equity in all parts of mitigation planning.

During the expedited planning process, the SHMT held a kickoff meeting on February 28, 2023, to review the previous threats and hazards, outline the tasks and timeline, and delineate the roles and responsibilities of the SHMT which includes supplying the necessary data to update the risk assessment. The SHMT began providing the requested data for the risk analysis in March and April and the draft risk assessment was created. Prior to the second SHMT meeting, the individual threat and hazard specific committees met separately and reviewed initial profiles, called primers, of their specific hazard assessment. Following these committee meetings, the SHMT met on June 21, 2023, to discuss the project schedule, project status, and the draft risk assessment. The introduction of the mitigation

strategy was given as well. Over the following months, the risk assessment was refined, and the full drafts of the hazard and threat profiles were reviewed and revised by the committees. The TAC also met to discuss and solidify the overarching mitigation strategy with the specific goals, objectives, and guidance on mitigation action formation. On November 8, 2023, the SHMT reconvened, and the mitigation strategy guidance was delivered to the threat or hazard specific committees. Following this committees had breakout sessions to develop mitigation actions. Throughout November, the draft sections of the plan were provided for review and feedback.

Figure ES- 1: Public Meeting in Bismarck

Source: AtkinsRealis, 2023

Public engagement was included in this process with two public meetings, individual outreach activities, and Community Coffee events as detailed in the Outreach Strategy. Findings supported the development of the plan update. NDDES held a public comment period in December to elicit additional feedback from citizens.

ES.2 North Dakota's Hazards and Threats

At the kickoff meeting, the SHMT assessed the hazards and threats identified in the previous plan as natural, technological, and adversarial threats. The natural hazards include drought, fire, flood, geologic hazard, infectious diseases, severe summer weather, severe winter weather, and space weather. Technological hazards are dam failure, hazardous material release, and transportation incident. Adversarial threats included criminal, terrorist, or nation-state attack, cyberattack, and civil disturbance. The SHMT separated terrorist/nation-state attack into two threats. The team subsequently grouped the hazards and threats into priority levels as follows:

Figure ES- 2: Priority Risk Index Ranking

High	Moderate	Low
Flood	**Dam Failure**	**Cyberattack**
Wildfire/Urban Fire	**Hazardous Material Release**	**Criminal Attack**
Drought	**Transportation Incident**	**Civil Disturbance**
Severe Winter Weather		**Terrorist or Nation-State Attacks**
Severe Summer Weather		
Infectious Disease and Pest Infestation		
Space Weather		
Geologic Hazards		

ES.3 The State's Mitigation Strategy

North Dakota's mitigation vision is to become the most disaster resilient state in the nation driving its purpose of minimizing the vulnerability of the citizens, lives, property, and the environment. NDDES partners with the State Hazard Mitigation Team (SHMT) to develop a comprehensive, statewide mitigation program. North Dakota was the first state in FEMA Region VIII to achieve enhanced status for their State Hazard Mitigation Plan in 2019. As a continuation of those efforts, this plan update has focused on expanding and strengthening mitigation goals and objectives to align with the progressive nature of the mitigation program.

The goals and objectives are considered a roadmap for the SHMT to develop North Dakota's mitigation strategy, prioritize mitigation actions, and evaluate the effectiveness of the actions.

Goal 1: Elevate hazard mitigation planning for State, local, and tribal jurisdictions.

- **Objective 1.1:** *Strengthen the 53 county, two city and four* tribal hazard mitigation plans as they come due for updating to serve as valued resources for integrating other community planning and risk reduction initiatives.*
- **Objective 1.2**: *Partner with 53 county, two city and four* tribal hazard mitigation planning teams to incorporate climate variability and potential climate change objectives into their local hazard mitigation plans.*
- **Objective 1.3:** *Host annual hazard mitigation planning trainings and/or workshops for local and tribal emergency management professionals, first responders, planning staff, subject matter experts, partners and elected officials.*

** Please note: the Sisseton Wahpeton Oyate tribe works directly with the South Dakota Office of Emergency Management on plan development.*

Goal 2: Enhance and expand public education and understanding of natural hazard risks and vulnerabilities within a changing climate, and the importance of developing effective mitigation and adaptation solutions within the whole community.

- **Objective 2.1:** *Leverage partnerships with subject matter experts and industry professionals to deliver hazard mitigation guidance, tools, and resources in a robust and engaging format.*
- **Objective 2.2:** *Target vulnerable and underserved populations when conducting outreach sessions across the state of North Dakota.*
- **Objective 2.3:** *Partner with local and tribal community leaders, emergency managers and the State Hazard Mitigation Team to engage in periodic plan developers' meetings as well as in equity mapping sessions to enhance awareness of underserved populations to be addressed in mitigation planning.*
- **Objective 2.4:** *Deliver public education and awareness information in new and/or already utilized mediums to promote efficiency and integration of emerging technology to reach more North Dakotans.*
- **Objective 2.5:** *Establish outreach pathways to organizations to reach identified underserved populations through community outreach based upon equity mapping findings.*

Goal 3: Improve disaster resilience to current and future buildings, structures, and infrastructure systems.

- **Objective 3.1:** *By the end of the next biennium, update, adopt, and maintain the North Dakota State Building Code in conjunction with the release of updated International Code Council (ICC) codes and standards such as the International Building Code (IBC) and International Residential Code (IRC), as well as updated National Fire Protection Association (NFPA) codes and standards. The North Dakota State Building Code, once adopted at the state level, will be available for use by all North Dakota communities in the development, adoption, and enforcement of local codes and standards.*
- **Objective 3.2:** *Advance flood resiliency efforts by encouraging jurisdictions and homeowners to participate in the National Flood Insurance Program (NFIP).*
- **Objective 3.3:** *Reduce the number of severe repetitive loss and repetitive loss properties in North Dakota throughout the life of the plan.*
- **Objective 3.4:** *Conduct an analysis of critical infrastructure sectors against the State's threats and hazards; develop resiliency strategies to safeguard and protect systems and critical facilities during disasters.*
- **Objective 3.5:** *Collaborate with partners to conduct a losses-avoided study to have actionable data to quantify the damages prevented from hazard events due to the implementation of past mitigation projects.*
- **Objective 3.6**: *Improve resilience to electromagnetic pulse and geomagnetic disturbances from space weather and electromagnetic pulse (EMP) impacts by identifying ways to warehouse and stockpile electrical materials and equipment on a regional basis and by acquiring and maintaining a large-format mobile substation for emergency deployment by 2027.*
- **Objective 3.7:** *Identify opportunities for risk reduction by strategizing long-term actions designed to lessen the potential failure of medium- and high-hazard dams and the cascading consequences.*
- **Objective 3.8:** *Reduce transportation incidents for roadway, rail, and aviation.*

Goal 4: Support a multi-sectoral mitigation approach from natural and technological hazards, and adversarial threats equitably through enhanced application of grant funding.

- **Objective 4.1:** *Continuously prioritize grant funding to align with ranking of hazards and threats based upon the findings in the 2024 Enhanced Mitigation Plan.*
- **Objective 4.2:** *Continue to expand outreach to potential grant applicants and provide resources where possible to guide the process, with availability for technical assistance, as opportunities arise.*
- **Objective 4.3:** *Host yearly cross-functional training opportunities to improve grant application quality to promote competitiveness for grant funding within and outside of Hazard Mitigation Assistance (HMA) grants.*

- **Objective 4.4:** *Continue to participate in the Program Administered by State (PAS) programmatic requirements and expand upon activities as needed.*
- **Objective 4.5**: *Continually work with emergency managers to promote community-wide grant eligibility to target underserved populations.*

Goal 5: Incorporate nature-based and climate adaptation solutions into cost-effective, environmentally sound, and feasible mitigation projects and actions.

- **Objective 5.1:** *Collaborate with state agencies, private organizations, tribal groups, and nonprofits to promote climate variability education and awareness and inspire action at events or presentations.*
- **Objective 5.2:** *Restore destabilized environments with native vegetation and other research-based solutions to promote adaptability.*
- **Objective 5.3:** *Improve natural resource quality, i.e., water, soil, and air, through nature-based activities and green infrastructure.*
- **Objective 5.4:** *Implement sustainable planning, design, environmental management, and engineering practices that weave natural features or processes into the built environment to promote adaptation and resilience.*

ES.4 Integration of Efforts

The SHMT prioritizes integration and collaboration in the development of the Enhanced Mitigation MAOP. Key stakeholders across the state were recruited for the SHMT and were heavily involved in the development of the plan through their roles as committee leaders and members. Committees gathered detailed information, revised existing information, and shared mitigation or adaptation strategies with the plan development team. NDDES highlights the importance of mitigation actions across all sectors including federal, state, tribal, and local government along with non-profit organization and private industry. Mitigation activities are often a core element in other plans. Section 5 looks broadly at these actions, and Appendix E.0 provides a list of plans that were integrated into this plan. The input from committee members throughout the process, however, is what ensures that integration is direct, and that the goals, priorities, and actions established in this plan extend beyond the initial planning process. The lifespan of the plan will continue to reflect the priorities of other state plans and the goals and strategies of our partners.

North Dakota has set high standards for integration and obtaining national goals, and in that effort achieved both enhanced mitigation plan status and consecutive accreditation from the Emergency Management Accreditation Program (EMAP), the latter of which occurred in October 2023. Enhanced standards and EMAP standards are reflected in this update of the Enhanced Mitigation MAOP.

ES.5 A Mitigation Strategy with Results

North Dakota has experienced 70 presidential major disaster or emergency declarations since 1957. Two of the declarations were awarded to tribal nations, a disaster declaration to Standing Rock Sioux Tribe

for severe storms and flooding that occurred in 2013 and an emergency declaration to the Three Affiliated Tribes of the Fort Berthold Reservation for COVID-19. The remainder were awarded to the State of North Dakota for jurisdictions impacted by 68 disasters. These include flooding disasters in the spring and summer tornadoes and severe storms in the summer and fall, and severe winter weather, including blizzards and ice storms. Large and memorable events like the 2011 floods that impacted the Mouse River most seriously, but created flooding across the state, caused more than $1 billion in damages. However, the stress from such losses lingers the longest in North Dakotan memories.

While these large events receive declarations and headlines, several other identified hazards occur regularly, causing damages that don't rise to the level of a declaration. Cyberattacks occur in the state daily and can devastate victims who face financial losses or the need to restore their identities. Other disasters can arise seemingly without expectation, such as the 2020 to 2023 COVID-19 pandemic, which generated more than $195 million in Public Assistance funding in the state. Impacts devastated families and communities dealing with the loss of lives and stress faced in coping with personal and societal mitigation measures that changed how many conducted their lives and businesses. Governments at all levels faced challenges of increased needs for resources at a time when revenues dropped.

The fact is hazards are unavoidable in North Dakota, but the damages from hazards can be avoided, reduced, and sometimes eliminated, through mitigation. The National Institute of Building Sciences reports intermittently on the benefit-cost ratio of hazard mitigation and in the most recent report (2019) found that hazard mitigation through federal grant programs saves $6 for each $1 spent (National Institute of Building Science, 2019). Pew Charitable Trusts refined this number based on advanced money management methods to $6.54 for every $1 spent on mitigation in the state (Pew Charitable Trusts, 2018). North Dakota has long been committed to this investment strategy. It is estimated that North Dakota has prevented more than $1.9 Billion in disaster damages and more than $24 billion in disaster recovery assistance since 1993 (NDDES, 2023). These metrics showcase the successes of mitigation project implementation across the state.

Figure ES- 3: North Dakota Nature

Source: Kathleen Duttenhefner, Natural Resources Division Chief, ND Department of Parks and Recreation

While the FEMA Hazard Mitigation Assistance Program has funded many of these endeavors, many mitigation actions come from other sources. The state has successfully removed more than 1,400 structures from floodplains, and it has upgraded culverts to reduce localized flooding, leveraging multiple sources of funding. Stakeholders have also invested in dam rehabilitation efforts and solutions to reduce the impacts of Devils Lake expansion. Investments in water resources have generated $7.2 million in annual losses avoided (NDDWR, 2023). Investments in safety in the transportation systems across the state have reduced the risk for mass-casualty transportation incidents. Investing in landslide data by the North Dakota Geological Survey has provided accurate data that can help future development avoid at-risk areas. Action by the Legislature has provided more latitude to enforce road closures during hazardous winter conditions. The Governor has prioritized cybersecurity education to assure improved resilience to cyberattacks. Mitigation is an investment that

the state prioritizes across agencies and branches. It is also taken seriously by municipalities and counties, as demonstrated by the creation of mitigation plans for each county and tribe in the state.

NDDES created a Mitigation Matters video in 2023 celebrating successes in the state and encouraging continued focus on reducing the consequences of disasters (https://youtu.be/Rbs-PNFN6lk?si=ltvRnxWJX2YFyyh7).

Planners continue to engage with communities through outreach to learn from community members about their experience and local knowledge regarding risk. The process of updating the plan gives the state and its stakeholders the opportunity to evaluate strategy implementation progress, identify areas where more can be done, and help SHMT members make connections with each other to further implement mitigation activities.

As disaster conditions worsen and mitigation practices evolve, the methods that are used to adapt must be modified as well. According to FEMA's *Building Community Resilience with Nature-Based Solution: A Guide for Local Communities* (2021, p.4), "Nature-based solutions are sustainable planning, design, management, and engineering practices that weave natural features or processes into the built environment to promote adaptation to resilience." Incorporating sustainable practices into mitigation provides the opportunity for state, local and tribal entities to expand on already existing practices such as prairie or wetland restoration, stormwater management, and encouraging individual action such as planting native grasses or pollinator gardens. Promoting the rehabilitation of the environment to intersect with mitigating impacts from threats and hazards is the ultimate goal of completing nature-based mitigation projects. Synchronizing activities alongside the natural environment helps promote healthy communities before, during, and after disasters.

This plan reflects how SHMT members look toward new opportunities in their continued commitment to building resilience.

1 Planning Process

1.1 Mitigation Planning in North Dakota

1.1.1 Plan, Mission, Purpose, Scope

The Enhanced Mitigation Mission Area Operations Plan (Enhanced Mitigation MAOP), referred to as the 2024 Plan Update throughout the rest of the document, represents a coordinated effort and ongoing commitment to mitigate potential losses and damages caused by hazards and threats that occur in North Dakota. North Dakota Department of Emergency Services planners, in coordination with the State Hazard Mitigation Team (SHMT), developed the state's first mitigation plan in 1989 with subsequent updates in 2000, 2002, 2004, 2007, 2010, 2013 and 2018. The 2024-2029 Enhanced MAOP identifies 15 natural and technological hazards and adversarial threats that pose a risk to the health, welfare, and security of citizens and first responders. These hazards and adversarial threats have the potential to disrupt delivery of service, continuity of government and the state's economy; jeopardize the public's confidence in governance; and cause extensive damage to property, environment, natural and cultural resources, critical facilities, community lifelines and state assets. State, local and tribal governments are responsible for developing and maintaining a high level of preparedness for all hazards and threats, including response, mitigation and recovery plans, training, and development and management of resources. The 2024 Plan Update focuses on a statewide mitigation strategy designed to increase North Dakota's resilience to hazards and threats.

1.1.2 Planning Process

Revisions to the Enhanced Mitigation MAOP required a robust whole community approach with representatives of 80 public and private organizations contributing support for the development of North Dakota's mitigation strategy. The State Hazard Mitigation Team (SHMT), led by North Dakota Department of Emergency Services (NDDES), coordinates the overall planning effort for every mitigation plan update. NDDES was able to build a comprehensive representation of the state with 18 federal agencies and offices, 39 state agencies and divisions, 19 local and tribal partners, 30 non-governmental organizations and private partners. North Dakota works hard to foster a level of integration that creates a culture of coordination and collaboration across departments and agencies on all levels of government. While NDDES coordinates efforts of the SHMT, committee chairs provide invaluable support by ensuring all public and private partners have a voice in the development of the state's mitigation strategy.

This robust planning process provided multiple opportunities for stakeholder engagement. Attendance at meetings reflected the high level of involvement with over 100 partners attending the kick-off meeting. Meetings were held in person and virtually with the SHMT and the Technical Advisory Committee (TAC). Each hazard committee also met once or twice for a review of their hazard profile sections and to provide feedback and comments. The commitment to engagement and collaboration

continued throughout the planning process with this diverse, invested group. Committee leads and members were invested in providing accurate and reputable data and worked collectively through 17 committees to analyze information and develop viable mitigation actions.

The expedited plan update process began in January of 2023, with the initial internal coordination call between NDDES and the consultant. A methodology for assessing the plan and developing the update was recommended by the consultant, AtkinsRéalis, to the NDDES Planning Lead.

The TAC, as the oversight committee tasked with establishing the vision and goals for the plan, and NDDES met with the consultant team on January 31, 2023, to outline the status of the North Dakota mitigation program and the direction for the plan update. The TAC established the priority to maintain the MAOP's enhanced status and meet the new hazard mitigation planning guidance requirements outlined by FEMA in the *State Mitigation Planning Policy Guide*. The new requirements include an emphasis on climate change and its correlation to threats and hazards as well as promoting equity in all parts of mitigation planning.

In the second meeting, the TAC assessed and revised the vision for the mitigation strategy by developing goals and objectives that would be defined for the SHMT in the kick-off meeting. The guidance document establishes an overarching goal for the SHMT to build on the state's successful history of mitigation planning and program implementation by ensuring:

- An SHMT empowered with the right resources to analyze adversarial threats and natural and technological hazards to determine the direction of a data-informed state mitigation strategy;
- Stronger risk assessments that delve fully into risk and vulnerability and offer a roadmap for selecting viable and achievable mitigation actions;
- A comprehensive climate change analysis that examines health, ecosystems, environmental, economic, transportation, energy production, and sociological impacts;
- A planning and outreach effort that gives an equitable voice to all sectors of our population; and
- An emphasis on developing resilient communities prepared to address the impacts of the state's hazards and threats by creating, selecting, and implementing a robust mitigation strategy.

The SHMT guidance document provides an overview of the state mitigation planning process and includes the purpose, importance of mitigation in the state, the foundation for the state's mitigation strategy, the roles and responsibilities of the group and the following SHMT objectives:

- Increase North Dakota's disaster resiliency by developing and maintaining an effective statewide hazard mitigation program that is supported by all levels of government, non-governmental organizations, and the private sector;
- Promote hazard mitigation efforts to reduce loss of life and damage to property and the environment by lessening the impact of disasters;
- Ensure North Dakota's continued eligibility for federal disaster recovery dollars; and
- Contribute expertise for development of the *Enhanced Mitigation MAOP,* which serves as the foundation for enactment of North Dakota's statewide mitigation program.

The SHMT initial kick-off meeting was then held on February 28, 2023, to discuss the SHMT guidance document, the status of the mitigation program and outline the objectives and tasks for updating the

Plan. The risk assessment meeting with all the stakeholders including the SHMT was held June 21, 2023, to preview the hazard identification and analysis findings. This meeting allowed the group to assess the rankings of the profiled hazards and make changes as needed.

The virtual mitigation strategy meeting was conducted on November 8, 2023, with the stakeholders. Breakout sessions for each hazard committee were a part of this meeting to guide engagement in the development of new mitigation actions. Two public meetings also took place in local venues. The initial public meeting was held at the Bismarck Veterans Memorial Public Library, following the risk assessment meeting. The second meeting followed the SHMT mitigation strategy meeting and was held at the Valley City Eagles Club. Throughout the planning process, NDDES continued its Community Coffee initiative to elicit insights from diverse sectors of the population.

All meeting materials can be found in Appendix C: Planning Process. The draft plan was completed in November 2023, was finalized, and submitted to the Federal Emergency Management Agency (FEMA) Region VIII for review. During this update, the Plan was revised to continue to meet new Enhanced State Hazard Mitigation requirements enacted in April 2023. State adoption was executed through a letter signed by the Governor, as shown in the Adoption Documentation section. This plan incorporates all changes associated with the implementation of federal and state hazard mitigation programs, including the applicable sections of the Disaster Mitigation Act of 2000.

The Plan is updated at least every five years, or after each disaster declaration if needed, by members of the SHMT. The NDDES also produces annual mitigation reports in which SHMT members provide updates on their progress with current mitigation actions. Each report offers the opportunity to spotlight SHMT's accomplishments, educate readers on evolving trends in mitigation, and discuss mitigation project implementation. These reports are located at: https://www.des.nd.gov/planning under the Documents tab. Additionally, *NDDES Insights*, the agency newsletter, features "Mitigation Matters" articles that spotlight various partners and provide helpful planning tools.

1.1.3 Schedule

Figure 1.1: Plan Development Schedule

Phase	Timeframe	Tasks	Meetings
Planning Process	January-March 2023	• Data collection • Threat and Hazard Identification and Risk Assessment data collection • Outreach Strategy	• Initial NDDES and Contractor Coordination Meeting • Bi-weekly Project Coordination Meetings • SHMT Kick-off Meeting • TAC Meetings
Risk Assessment	April-June 2023	• Hazard profile development • Draft plan Development	• Bi-weekly Project Coordination Meetings • Hazard Committee Meetings • SHMT Risk Assessment Meeting • Bismarck Public Meeting
Mitigation Strategy	July-September 2023	• Draft Plan Development • Draft profile sections for state and committees • Mitigation Strategy Development	• Bi-weekly Project Coordination Meetings • Hazard Committee Meetings

Phase	Timeframe	Tasks	Meetings
Mitigation Strategy Plan Adoption and Maintenance	October-December 2023	• Draft profile sections for state and committees • Mitigation Strategy Development • Develop Mitigation action guidance documents • Provide other section drafts to state	• Bi-weekly/weekly Project Coordination Meetings • Hazard Committee Meetings • TAC Meeting • SHMT Mitigation Strategy Meeting • Barnes County Public Meeting
Plan Adoption and Maintenance	December 2023-January 2024	• Implement revisions from state • Submit final draft to FEMA	

1.1.4 Planning Meetings

NDDES designated the Deputy Planning Chief and the State Hazard Mitigation Officer to be the "North Dakota Project Leads" for the entirety of this plan update. NDDES hired a consultant, AtkinsRéalis, to support the state's development of the plan, as well as assist in stakeholder engagement. Bi-weekly meetings were held between NDDES and the consultant throughout the life of the project.

Numerous meetings were held from January 2023 through November 2023. Following the initial coordination meeting between NDDES and the consultant, the TAC met in January with the consultant to outline the vision for the Enhanced Mitigation MAOP along with the mitigation priorities for the state of North Dakota. During the first meeting with the TAC on January 31, 2023, the members of the committee expressed their viewpoints on the importance of mitigation which led to the subsequent development of a video, titled Mitigation Matters, https://www.youtube.com/watch?v=Rbs-PNFN6lk.

Figure 1.2: Mitigation Matters Video

Source: NDDES, 2023

The following meeting with the TAC on February 14, was utilized to review the SHMT guidance and the Enhanced Mitigation MAOP Vision prior to sharing it with the SHMT at their kick-off meeting.

The entire SHMT met collectively three times during the plan update. Active participants included the ND National Flood Insurance Program (NFIP) Coordinator, the TAC, hazard- and threat-specific committees, and the planning committees. The official kick-off meeting of the SHMT was conducted virtually on February 28. The meeting summarized the mitigation program's history and development, the progression of climate change in the mitigation planning efforts, the roles and responsibilities of the team, identification of hazards and threats, and the data collection process. This meeting also allowed the SHMT to collectively discuss the hazards and threats that were represented in the current plan and determine if adjustments needed to be made.

SHMT members were presented with data collection requirements and asked to provide data to be used in the hazard profiles and risk assessment. Various members of the SHMT to include the State NFIP Floodplain Coordinator provided hazard specific data. A full listing of the data collected can be found in Appendix B.1 and I.2. Following the kick-off meeting, draft hazard primers were provided to the hazard and threat specific committees for review, and to generate discussion. Committee chairs served an integral role in coordinating review of content and providing feedback. That feedback was utilized to continue drafting the profiles for each hazard and threat.

The second meeting of the SHMT on June 21, 2023, provided the risk assessment overview with the rankings of the hazards that were presented during the kick-off meeting. The NDDES Division of Homeland Security Director, Darin Hanson, opened the meeting and outlined the specifics of an enhanced mitigation plan and its benefits. The project overview and current plan update status followed with a refresher regarding the committees and an update on public involvement efforts. The main portion of the meeting was to examine the Priority Risk Index (PRI) methodology and the findings for the ranking of the hazards and threats that had previously been identified. An overview and the impact of climate change on each hazard was presented. The differences between the previous assessment in 2018 and the current findings were evaluated and the SHMT provided feedback on the appropriate rankings of the hazards and threats. The mitigation strategy process was introduced with the current mitigation actions and ideas of how to move toward potential new actions. Following this meeting, stakeholders provided additional feedback on the risk assessment findings. Each hazard and threat specific committee met to review their respective hazard profiles, provide revisions, and supplemental data to support the refinement of the profiles.

A public meeting was also held on June 21 at the Bismarck Veterans Memorial Public Library. This event provided an opportunity for citizens to understand the mitigation planning process and weigh in on the various hazards and threats. Attendees listened to a short presentation and were encouraged to visit the stations within the room which explained mitigation, outlined the project timeline, and listed potential mitigation actions. The stations which surrounded the room helped to elicit feedback through interactive boards, and to allow participants to express concerns, share action ideas and to discuss climate variability and change with the NDDES Meteorologist. Some ideas which came forward included limiting water use during extreme drought periods, rehabilitating the environment and mitigating saltwater spill impacts.

Prior to the third SHMT meeting, the TAC reconvened on November 1 to establish goals and objective guidance for the mitigation strategy. The consultant provided an assessment of the current mitigation goals and offered some recommended changes to them as well as the objectives. Upon review, the TAC further refined the goals and objectives which defined a strategy for creating new mitigation actions.

The third SHMT meeting took place on November 8, 2023, to focus specifically on the mitigation strategy with a goal of developing mitigation actions for each threat and hazard. A refresher on the PRI rankings of all hazards and threats was provided along with an updated synopsis of each hazard and threat. The mitigation strategy session commenced with a TAC member outlining the process for strategy building to include a description of the six mitigation techniques, the newly revised goals and objectives, logistical support, and mitigation examples. Each hazard and threat committee then went into breakout sessions with the purpose of generating new mitigation actions. Each breakout room had an NDDES or consultant facilitator along with the committee chair. Prior to the session, hazard and threat specific synopses, the mitigation goals and objectives, recommended mitigation actions specific to each hazard and the annual mitigation report were provided as references. Each committee's actions and responses were used to complete the mitigation strategy.

A public meeting in Barnes County followed the mitigation strategy meeting on the evening of November 9 at the Valley City Eagles Club. A similar format to the first public meeting was utilized with various display boards but was more focused on the mitigation strategy and action ideas. Attendees were able to offer their ideas for mitigation actions for inclusion in the plan. Participants shared their experiences with hazard events, discussed successful mitigation strategies previously implemented, such as acquisitions of flood-prone property and levees and identified potential mitigation actions, such as storm shelters and sirens at parks.

North Dakota citizens were given an opportunity to comment on the draft plan in December. NDDES disseminated a news release announcing the public review and link to the NDDES website where the plan could be found. NDDES also posted the NDDES Mitigation Planning Hub where state, local, tribal, public and private stakeholders could review and provide comments on the Enhanced Mitigation MAOP. The hub featured a virtual meeting room that allowed attendees to feel as if they were in a shared space with multiple display boards and a link directly to the plan. This also offered an opportunity for public comment and feedback. No comments were received by December 31, 2023.

1.1.5 State Hazard Mitigation Team Structure

The SHMT consists of the TAC, Hazard Specific Committees and Planning Committees. Each of these stakeholder groups had different expectations and responsibilities throughout the planning process, the details of which are outlined below.

1.1.5.1 Technical Advisory Committee

The TAC sets the overall priorities beyond the requirements from FEMA. This committee is comprised of leaders from each of the hazard specific committees. The TAC included representation from the NDDES, Division of Homeland Security, National Weather Service (NWS), North Dakota Department of Health and Human Services (NDHHS), North Dakota Department of Transportation, North Dakota Emergency Management Association, North Dakota Department of Water Resources, North Dakota Department of

Commerce; North Dakota Department of Agriculture, North Dakota Parks and Recreation Department and FEMA Region VIII.

1.1.5.2 Hazard-and-Threat-Specific Committees

Hazard and Threat-Specific Committees provide a more in-depth evaluation and analysis of the hazard information in the risk assessment and the associated mitigation initiatives. These committees allow for broader participation by agencies and organizations that have a focus or an interest in a particular hazard or threat. There was a wide representation of agencies and organizations that participated in these committees, including state and federal environmental agencies, non-profit organizations and local and tribal governments. Appendix B lists the agencies represented on the committees. Membership of committee members was open to all interested persons or organizations. If a logical agency was noticeably missing from the committee, an invitation to participate was extended to that organization. Invitations can also be found in Appendix B. These committees discussed and reviewed their specific hazard or threat profiles through two separate iterations as well as the mitigation strategies and actions applicable to the hazards. The committees are as follows:

- Adversarial Threats-Civil Disturbance, Cyber Attack, Criminal Attack, Terrorist or Nation/State Attack
- Dam Failure
- Drought
- Fire
- Flood
- Geologic Hazards
- Hazardous Materials Release
- Infectious Diseases
- Severe Summer Weather
- Severe Winter Weather
- Space Weather
- Transportation Incident

1.1.5.3 Climate Change Committee

In the previous 2018 Plan, potential future conditions and climate change impacts were included in each of the hazard profiles. Since that time, there's been a steadily increasing emphasis on climate change, its potential impacts, and possible adaptation or mitigation efforts. Some mileposts since that 2018 Plan's development have been:

- The TAC's charge that the SHMT delve more deeply into long-term climate change for future planning (2019+);
- An expanded Issues analysis, where North Dakota partners provided lists of issues to include the suggestion that climate change may have significant impacts based on subject matter expertise (2020-2023);
- The April 2022 release of the updated FEMA Mitigation Planning Policy Guides (State/Local/Tribal), which became effective April 2023; and

- The November 2023 release of the 5th National Climate assessment (NCA5).

The Climate Change Committee for this 2024 Plan update was formed in the spring of 2022 with a diverse group of participants that continued to expand through 2023. The first meeting of some 25 committee members, held in preparation for 2023 update kick-off was on June 6, 2022, with a follow-up meeting held on July 26, 2022. The committee's stated purpose was as follows: *Expand the State of North Dakota Enhanced Mitigation Plan's Climate Change Baseline Assessment to address impacts on people, property, economy, and the environment; and support efforts by the North Dakota Department of Emergency Services to develop climate change analytics for use by tribal and local mitigation planning teams.*

The committee's efforts in 2022 began with the NWS Bismarck office providing a preliminary update of the climate change baseline assessment for each hazard using the 4th National Climate Assessment (NCA4), North Great Plains analysis, and with one-on-one interviews among select committee members. Through these two efforts, the committee began a detailed look at how different agencies, sectors, and individuals within those sectors might regard future climate impacts. These conversations also uncovered adaptation and mitigation strategies that were directly related to North Dakota citizens. An online survey tool was first utilized in 2022 within the committee and retooled in 2023 for expanded use among other SHMT members and our Local and Tribal Emergency Managers, throughout the plan update. The State Climatologist's Office (NDSCO) has led the committee with the support of NDDES.

The Climate Change Committee participated in the plan update kick-off meeting and met again on March 6, 2023, to discuss their initiatives.

Throughout the Spring of 2023 the committee worked to re-energize efforts that had begun in 2022 and see them through to completion as follows:

- Worked with the Outreach Committee to revise the survey and re-release an updated survey tool with two distinct links, one for SHMT members and another for county and tribal emergency managers, to better preserve any differing response tendencies between the two groups.
- Conducted interviews among original committee members, added more members and discovered additional to capture more information on future climate conditions affecting the state leading to the development of more equity considerations.
- Updated the baseline assessment and included information provided by newer source material included in the (draft) NCA5 and the 2022 North Dakota State Climate Assessment.
- Participated in each of the other hazard committee meetings and hazard profile reviews.

1.1.5.4 Planning Committees

Unlike the Hazard and Threat Specific Committees, the Planning Committees focused on broader, overarching strategies, including critical facilities and infrastructure, and oil and gas industry expansion. The committees represented are the Tactical Communications and Outreach, Local Planning Coordination and Capability Building, and the Oil and Gas Industry. These committees also provided evaluation of the risk assessment and mitigation strategies. Appendix B lists the individual agencies represented on the committees.

1.1.6 Roles and Responsibilities

1.1.6.1 Participation in Plan Development

Staff members from the NDDES Planning, Recovery, and Mitigation Sections coordinated with all SHMT members throughout the 2023 planning process. NDDES reconvened the hazard and threat-specific committees from the 2018 plan update to gather new information or changes in research for the last five years. The NDDES also conducted outreach and coordination to ensure broad-based participation in the planning process. Planning meetings were well attended, with significant representation at the kick-off and mitigation strategy meetings. Committee members assisted with the update process by providing data for hazard profiles, reviewing, and revising the hazard profiles, providing feedback on the mitigation goals and objectives, creating new mitigation actions, and reviewing drafts of the plan update. The state NFIP Coordinator was instrumental in reviewing and providing feedback on the flood hazard profile on multiple iterations and discerning appropriate mitigation actions for the flood hazard.

The SHMT was given an opportunity to comment on the draft risk assessment following the risk assessment meeting in June and with the review of the individual hazard or threat profiles in each of the committees. The final risk assessment was also reviewed at the mitigation strategy meeting in November. The entire draft plan was available for review in December to the SHMT. Appendix B.1 and B.2 summarize the participation of all the SHMT agencies in the different planning process meetings.

1.1.6.2 Participation in Identifying Mitigation Goals and Objectives

The Mitigation Strategy discussion began with the TAC receiving updated goals and objectives recommendations for review. Once the TAC met and reviewed the mitigation strategy guidance the goals and objectives were revised to share with the entire SHMT. The SHMT was asked to provide feedback regarding the proposed mitigation goals and objectives during the mitigation strategy meeting in November. SHMT members reviewed the mitigation guidance documentation in their breakout sessions as part of the SHMT Mitigation Strategy Meeting. Examples of mitigation actions and a template for creating new mitigation actions were disseminated. Each committee utilized the guidance to craft new mitigation actions to provide to the consultant team for compilation into the plan. A copy of the annual mitigation report was also provided for an assessment of the current mitigation actions and updates.

1.1.6.3 Providing Access to Data

As part of the kick-off meeting held on February 28, 2023, SHMT members were asked to provide data from their specific departments, agencies, and organizations to gather changes in development. The data and resources were gathered for use in the risk assessment in analyzing the hazards and the impacts within the state. Additional data was also provided throughout the process, especially with any revisions that required more information. Specifically, the state NFIP Coordinator conducted research to support data requests on the repetitive loss and severe repetitive loss properties for North Dakota.

1.2 Outreach Strategy

From the 2018 Plan update, NDDES determined that a solid public outreach strategy was warranted and the SHMT focused on ways to engage with a variety of stakeholder groups with the development of a strong outreach strategy. Therefore, NDDES staff, with the assistance of the SHMT members, conducted an outreach strategy that prioritized a whole community approach to reach all North Dakotans.

The strategy outlined six tactics that would be employed to guide the outreach for the planning process of the mitigation plan update. The SHMT was involved in the process and informed of the strategy throughout the life of the plan update. Feedback and information from various stakeholder groups were collected through the planning process for inclusion in the plan update. This included the continued initiative of a successful Community Coffee program as well as individual stakeholder group meetings that evolved and were held across the state to inform citizens of hazard mitigation and to elicit public feedback on hazards and threats.

NDDES staff sought out opportunities to meet with the Minot State University Center for Persons with Disabilities, the North Dakota State Library, Oil and Gas Industry safety professionals' networks, 4-H Youth Organization, North Dakota State University (NDSU) students and Adams County Citizens. NDDES also coordinated with the Standing Rock/Sioux mitigation planning effort that was developed during the same timeline. The representation of participants was diverse and showcased a variety of organizations and perspectives. There were increased efforts to engage with the Tribal Nations, including directed contacts with tribal leadership, emergency managers and both cultural and environmental experts within our tribal communities. This included one-on-one discussions, small group meetings, participation in the 2023 Tribal Leadership Summit and Climate Change and Environmental Justice session along with North Dakota Department of Environmental Quality representatives. Each group offered different viewpoints on hazards and threats in their community with many individuals representing more than one viewpoint. An example of this was found during the Safety Industry Alliance meeting with oil and gas workers with a participant who worked in the industry but was also a firefighter at Dickinson Rural Fire Department. Stakeholders were informed about mitigation planning and state efforts, presented the threats and hazards, and had a facilitated discussion or activity to explore thoughts and brainstorm mitigation actions. Feedback collected was utilized to address equity across the assessment of the hazards. Participants discussed how the hazards and threats impacted them personally, as a community, and shared their ideas for mitigating their impacts.

The full strategy can be found in Appendix B. Some of the mechanisms identified in the Outreach Strategy are described in further detail below.

1.2.1 Website and Social Media Postings, Email Communications and Newsletters

Project messaging, materials and status updates were shared with interested parties, stakeholders and the public through website and social media posts, email communications and newsletter articles. NDDES published a bi-monthly newsletter, NDDES Insights, which had an article addressing this project in an issue. Email communications were used to share project information with project committee members and other stakeholders throughout the project. The materials developed for this project, project status updates, survey links and public meeting advertisements were posted on Facebook, LinkedIn and Twitter. Project announcements, notifications and links to information available online were posted on social media in advance of public meetings, at project milestones, when the project surveys were sent out and when new information was made available online.

1.2.2 Community Coffees and Public Meetings

NDDES facilitated Community Coffees with various focus groups including, Minot State University Center for Persons with Disabilities, NDSU students, an LBTQ2S+ group, the New Americans/Foreign Born/Immigrants Board, senior citizens, oil workers and first responders as well as local emergency managers and their citizens. These meetings were to understand how hazards impact their lives and brainstorm mitigation opportunities. NDDES worked through identified stakeholder groups to facilitate these meetings. Specific feedback received from these Community Coffees and public meetings has been summarized in call-out boxes throughout the hazard profiles in the Risk Assessment section. Detailed notes from the Community Coffees can be found in Appendix B.4.9.

Figure 1.3: Community Coffee Announcement and Meetings

Source: NDDES, 2023

1.2.3 Surveys

An online survey was released through the NDDES website, social media and physical dissemination to collect feedback from public stakeholder groups outside of the SHMT. The survey was posted online

from June 15, 2023, to November 15, 2023. This data was collected to ensure that the Enhanced Mitigation MAOP aligns with the needs and priorities of the public. There were 260 online responses and five hard copy submissions to the public survey providing information on citizens' concerns, plans for preparation and the hazards that the state should focus on preparing for and mitigating. A local and county emergency management survey was also released through NDDES to gauge the concerns and gather feedback from emergency managers. The results of both surveys are summarized in Appendix B.4.2. Overall, North Dakota's planning process utilized plans and agencies that represented the interest of the general public and local hazard mitigation plans (HMPs) were incorporated into the Plan as a means of integrating the local and state planning efforts.

1.3 Plan Structure

As part of the 2024 update, the outline of the plan was revised, and new data based on the past five years was gathered and included. Changes were incorporated in every section of the Enhanced Mitigation MAOP during the update process. A high-level overview of the changes included are:

- Situation section was renamed Background;
- Addition of separate Climate Change section;
- Expanded consequence analysis of each hazard and threat profile;
- Expanded climate change discussion for each hazard or threat addressing impacts, mitigation, and adaptation;
- Criminal Attack extracted as a separate hazard with its own profile;
- Execution section renamed to Mitigation Strategy
- Inclusion of short-term and long-term mitigation strategies and actions;
- Alignment with Emergency Management Accreditation Program (EMAP) standards;
- Reorganization of the plan for readability and format to include a new format for the mitigation actions;
- Updates and improvements to all sections of the previous plan;
- Incorporation of information and comments collected at stakeholder meetings and through other means;
- Update of the historical, facility, infrastructure, and development data;
- Additional Geographic Information System (GIS) mapping using new and updated data to include vulnerable population identification;
- Statements and reports highlighting the changes that have occurred since the previous version of the plan;
- Further documentation and evaluation of the state's pre- and post-disaster policies and programs;
- Review and assessment of the local mitigation policies and programs and inclusion of information from new or updated local HMPs;
- Update and refinement of the mitigation strategy based on changes since the previous version of the plan was approved;
- Update of the list of possible mitigation funding sources and mitigation-related laws; and
- Additions and improvements to the plan to meet FEMA enhanced state plan criteria.

Figure 1.4 lists the sections of the plan and highlights changes or improvements made during the 2024 update.

Figure 1.4: Summary of Changes - 2024 Enhanced Mitigation MAOP

Section	Summary of Changes
Front Material	• Updated Executive Summary with mitigation program progress • Added 2024 state approval letter
Section 1. Planning Process	• Summary of the 2024 planning process with meetings, outreach, and public involvement
Section 2. Background	• Renamed section to Background from Situation • Added new state demographics with updates for current and future land use, cost of disasters in the state, and legal references
Section 3. Climate Change	• Added an entire section focusing on climate change in ND
Section 4: THIRA	• Updated to include new data through 2022 and 2023 in some cases • Added new GIS mapping and analysis • Criminal Attack identified and profiled as a separate hazard • Addressed vulnerable populations with hazards and mapping efforts • Provided updated methodologies for assessing risk and vulnerabilities for hazards when possible
Section 5. Capability Analysis	• Updated state capabilities and local capabilities analyses to ensure advances were captured
Section 6. Mitigation Strategy	• Renamed from Execution to Mitigation Strategy • Updated mitigation goals and objectives • Updated progress on current mitigation actions • Added new mitigation actions per mitigation technique categories and hazard
Section 7. Plan Maintenance	• Revised and updated to reflect the current process for updates and the annual mitigation report
Section 8. Appendices	• Updated with information from the 2024 planning process

1.4 Planning Process Conclusions

The planning process defined “Whole Community” with a broad-based public-private partnership and a high level of involvement by each member of the community. This phrase and approach highlight the importance and intentionality behind meeting with underserved populations who may face additional barriers during disasters. This diverse approach collects input for all areas of our communities as well as economic drivers. The findings from these events were eye opening and called planners into action.

The outreach strategy expanded to reach more diverse stakeholders and previously under-represented audiences and groups. Great success also occurred in efforts to align with other entities’ public engagement and outreach activities. This integration effort provided NDDES with robust participation. In addition, staff developed consistent messaging and materials that are available to all audiences and conducted direct stakeholder engagement activities. Social media efforts were frequent and strategic, the consultant and NDDES both utilized geofencing marketing to solicit responses. All outreach activities, findings and the schedule were tracked for documentation.

The continuation of the Community Coffees was also incorporated to focus on the traditionally under-represented groups such as LGBTQ2S+, New Americans, houseless individuals, rural communities, tribal groups, and other pockets of underserved individuals that are identified by tribal or local emergency management.

Plan development occurred in a compressed time period based on NDDES operational pace. For the next update, NDDES recommends a longer time period to discuss the hazard and threat profiles, capabilities and mitigation actions. During this update, the SHMT accommodated quick turnarounds in a clear demonstration of their level of commitment to mitigation in North Dakota. In the years leading up to plan revision, NDDES staff Community Coffees held throughout the state proved to be a valuable platform for hearing from diverse groups about hazard and threat concerns and ideas for mitigation measures. Through its Community Coffees and outreach initiatives, NDDES will continue to promote and engage stakeholders on mitigation leading up to the next plan update. This will also be beneficial to produce the annual mitigation report with an update of the mitigation actions yearly.

Committee members provided a substantial amount of data to analyze and incorporate into the plan. While a challenging task, NDDES believes the investment in time and energy to review the data resulted in a stronger plan. Each hazard and threat profile contains a conclusion of the data that provided the foundation for developing the state's mitigation strategy with a focus on the consequence analysis, climate change, and equity. As demonstrated with past updates to mitigation actions, the SHMT adjusted the actions to reflect changes in priorities and integrate other planning efforts along with examining each hazard and threat as it is affected by climate change such as nature-based mitigation action.

The NDDES team is extremely grateful for the SHMT and TAC partners, along with all stakeholders along the way. This plan is a true group effort and cannot be done alone. We are continuously impressed by the passion and expertise of our partners.

2 Background

2.1 Legal Authorities and References

NDDES convened the SHMT for the purpose of developing an update to the State of North Dakota Enhanced Mitigation MAOP, in accordance with Section 322 of the Disaster Mitigation Act of 2000 (USC 106-390), which amends the Robert T. Stafford Disaster Relief and Emergency Assistance Act (the Stafford Act) (USC 117-328). Relevant regulations that guide the development of the plan can be found in 44 Code of Federal Regulations (CFR), Part 201, which require that the state mitigation plan be updated every five years and that it (44 CFR Part 201) does the following:

- Describe an effective planning process,
- Conduct statewide risk assessments that analyze natural hazards,
- Develop a mitigation strategy for reducing losses to threats identified in the risk assessment,
- Discuss the state's process to support and coordinate with local and tribal mitigation planning,
- Establish a plan maintenance process for implementing and evaluating the plan,
- Undergo a state adoption process, and
- Assure the state will comply with relevant statutes and regulations (44 CFR Part 201).

The SHMT achieved requirements for both Standard State Mitigation Plans (44 CFR Part 201.4) and Enhanced State Mitigation Plans (CFR 201.5 Enhanced Plan) in 2019. This update to the Enhanced Mitigation MAOP reflects continued compliance with both standard and enhanced mitigation plan requirements.

The North Dakota Century Code (NDDC) 37-17 1-10, as amended, places the responsibility for the development of the hazard mitigation plan on NDDES (NDCC § 37-17 1-10). The Governor's role is to issue guidance to state agencies to mitigate the effects of natural and technological hazards and adversarial threats on citizens of North Dakota. The Governor, through NDDES, administers mitigation guidance and funding to state, local and tribal governments requesting funding in state and federal recovery agreements. Under requirements of the Disaster Mitigation Act of 2000, local and tribal governments develop and submit hazard mitigation plans for state and federal review to maintain eligibility for the Hazard Mitigation Assistance (HMA) grants used to fund projects identified in mitigation plans. (N.D.C.C. § 37-17 1-10). Availability of Hazard Mitigation Grant Program (HMGP) funding follows a Presidential Declared Disaster. Funding also becomes available annually through both the Building Resilient Infrastructure and Communities grant and the Flood Mitigation Assistance grant. While not included, the local and tribal hazard mitigation plans are considered appendices to this plan, which incorporates data and information from these plans.

2.2 Overview

2.2.1 Cost of Disasters in the State of North Dakota

The full cost of disasters impacting the state is impossible to completely attain. Capturing the full costs of documented damages is a continuous challenge. Frequently the data available fails to include the cascading impacts that can continue into the future. For example, a flood that impacts a workplace may impact the income or employment of employees; wildfire smoke may cause the hospitalization of an asthmatic patient many miles away; drought conditions may lead to reduction of herd size, impacting the financial situation of a family; heavy snow may impact the economic productivity of a business; and volunteer firefighters may suffer from fatigue from wildfires that lead to a slow response to an urban fire, thus resulting in more damage than would otherwise be anticipated. These cascading impacts are difficult to quantify but should be considered as indirect costs of disasters that are no less impactful to the person or entity experiencing it.

FEMA Public Assistance (PA) is perhaps the best measure available to calculate the direct costs of disasters in North Dakota as recognized by the federal government. These are funds obligated in relation to a federally declared disaster and can be effective in comparing the scope of one disaster's impact on the community as related to another. **Figure 2.1** displays the PA declared disasters in the state from 2019 through 2023. During that time, eight disasters were declared, and $274,095,428.71 was obligated for PA (NDDES, 2023). The COVID-19 pandemic was the costliest disaster at more than $188 million (NDDES, 2023). Second highest was a $63 million severe winter storm and flooding in April and May of 2022.

Figure 2.1: FEMA Public Assistance Funding since 2019

Incident Year	Number	Title	Eligible Obligated	Approximate Cost
2019	4444	Flooding	$10,660,664.27	
2019	4475	Flooding	$14,118,291.51	
2020-2023	4509	COVID-19 Pandemic	$188,164,193.68	$237,463,057.37
2020	4553	Flooding	$11,973,232.17	
2020	4565	Severe Storms, Straight-line Winds and Flooding	$2,833,163.67	
2021	4613	Severe Storms and Flooding	$2,991,162.66	
2022	4660	Severe Winter Storm and Flooding	$63,299,460.53	$88,030,269.54
2022	4686	Severe Winter Storm, Snowstorm and Straight-line Winds	$202,329.36	$2,142,112.76
2023	4717	Flooding	$471,095.59	

Source: NDDES, 2023

PA funding does not cover all impacts of a disaster, nor does it fund disasters other than those that are substantial enough to warrant a federal disaster declaration. Smaller disasters can be just as or more impactful to North Dakotans and their communities, which bear the costs of these smaller disasters that do not meet federal requirements for assistance.

HMA funding availability is tied to PA funding, and the SHMT actively pursues HMA funding and other funding to reduce the impact of future disasters. In addition to HMA, communities often use the U.S. Department of Housing and Urban Development's Community Development Block Grant (CDBG) funding to further protect critical infrastructure or alleviate harm from disasters. While inherently understood, it bears repeating to state it is in the best financial interest of the state to mitigate disasters.

North Dakota has a Disaster Relief Fund (DRF), codified into the Century Code (N.D.C.C. 37-17 § 1-27), which has a balance of $18,524,149 as of June 2023 (NDDES, 2023). This fund is used for the purpose of providing cost match for FEMA grants and search-and-rescue cost reimbursement (N.D.C.C. 37-17 § 1-27). Each biennium, the DRF is the sixth priority to receive funding from the oil and gas fund, and the DRF is replenished to a minimum $20 million balance (N.D.C.C. 57-51 § 07.5*).* The state's emergency commission, comprised of executive and legislative leaders, can approve line items or fund transfers from the DRF budget to address the needs of specific disasters, but under some conditions, the emergency commission must also obtain approval from the Legislative Budget Section Committee

While establishing the true cost of disasters is difficult, studies that track the cost savings and benefits of mitigating disasters are clear as to the benefits of this activity. The National Institute of Building Sciences reports on the benefit-cost ratio of hazard mitigation and the most recent report (2019) found that hazard mitigation through federal grant programs saves $6 for each $1 spent (Multi-Hazard Mitigation Council, 2019). That number has been refined for North Dakota by Pew Charitable Trusts to be $6.54 for every $1 spent on mitigation (NDDES, 2020; Pew Charitable Trusts, 2020). Furthermore, some activities, such as the adoption of the most recent building codes and the mitigation of riverine flooding can produce even higher returns, as shown in **Figure 2.2**.

Figure 2.2: Hazard Mitigation Savings

Mitigation Type	Savings Per Dollar
Federal Grants	$6.00
North Dakota Federal Grants	$6.54
Riverine Flooding	$7.00
Wildland-Urban Interface	$3.00
Adopting 2018 Building Codes	$11.00
Adopting 2015 Building Codes	$4.00
Infrastructure Protection	$4.00

Sources: Multi-Hazard Mitigation Council, 2019; NDDES, 2020

2.2.1.1 Federal Declaration History

Presidential Disaster Declarations help to provide resources for jurisdictions to respond to and mitigate disasters. North Dakota has had 68 Presidential Disaster Declarations since 1955, while the Three Affiliated Tribes of the Fort Berthold Reservation and Standing Rock Sioux Tribe have each had one, for a total of 70 federal declarations within the state. Just under half (32) have been declared for flooding, as shown in **Figure 2.3** (FEMA, 2024). Although flood disasters have dominated North Dakota's disaster history, the past 30 years have had a wider variety of hazards covered under Presidential Disaster Declarations, including biological hazards (COVID-19), coastal storm evacuation assistance (Hurricane Katrina), along with numerous severe summer and winter storms.

Figure 2.3 North Dakota Presidential Disaster Declarations by Type, 1955-2023

Hazard Type	Number	Hazard Type	Number
Flood	32	Coastal Storm	1
Severe Summer Storm	20	Drought	1
Severe Winter Storm	12	Fire	1
Biological	3	**Total**	**70**

Source: FEMA, 2024

Figure 2.4 shows all federal declarations, the year in which they were declared, the type of disasters, the declaration date and the incident period. The first North Dakota disaster to earn a federal designation was the historic 1957 Fargo Tornado that was studied by Dr. Ted Fujita, who would later create the Fujita damage scale (NWS, 2023). As noted in Figure 2.3, flooding has predominated North Dakota's disaster history.

Most disasters encompass multiple concurrent hazards and span numerous county and local jurisdictions. For instance, the singular disaster declaration of March 24, 2009, spanned late season severe winter storms, catastrophic snowmelt flooding, ice jams, subsequent ground saturation, and compounding severe summer storms which all impacted the response and recovery periods of the disaster. Severe Summer Storm components often include damages from tornadoes, hail, damaging winds, flash or landscape flooding, and landslides or mudslides. The state received an emergency declaration enabling evacuee support during Hurricane Katrina in 2005, a drought emergency declaration in 1976, and both an emergency and a disaster declaration for the COVID-19 pandemic in 2020. Three Affiliated Tribes of the Fort Berthold Reservation received an emergency declaration for COVID-19 in 2020 while Standing Rock Sioux Tribe was designated a disaster area in 2013 for severe storms and flooding. Presidential Disaster Declarations first require county scale and/or state scale disaster declarations, and a subsequent request by the Governor to the President.

Figure 2.4: Presidential Disaster Declarations (1955-2023)

#	Year	Hazard Type	Disaster Number	Declaration Date	Incident Period*
1	**1957**	North Dakota Tornado	DR-79-ND	June 22, 1957	June 22, 1957
2	**1965**	North Dakota Flooding	DR-195-ND	May 10, 1965	May 10, 1965
3	**1966**	North Dakota Flooding	DR-216-ND	March 23, 1966	March 23, 1966
4		North Dakota Severe Storms, Flooding	DR-220-ND	July 9, 1966	July 9, 1966
5	**1969**	North Dakota Flooding	DR-256-ND	April 18, 1969	April 18, 1969
6	**1970**	North Dakota Severe Storms, Flooding	DR-287-ND	June 5, 1970	June 5, 1970
7	**1972**	North Dakota Severe Storms, Flooding	DR-335-ND	June 10, 1972	June 10, 1972
8	**1974**	North Dakota Heavy Rains, Snowmelt, Flooding	DR-434-ND	May 14, 1974	May 14, 1974
9	**1975**	North Dakota Flooding from Rains, Snowmelt	DR-469-ND	May 24, 1975	May 24, 1975
10		North Dakota Severe Storms, Flooding	DR-475-ND	July 11, 1975	July 11, 1975
11	**1976**	North Dakota Severe Flooding	EM-3012-ND	April 13, 1976	April 13, 1976
12		North Dakota Flooding	DR-501-ND	April 16, 1976	April 16, 1976
13		North Dakota Drought	EM-3016-ND	July 21, 1976	July 21, 1976
14	**1978**	North Dakota Blizzard and Snowstorms	EM-3061-ND	February 16, 1978	February 16, 1978
15		North Dakota Storms, Ice Jams, Snowmelt, Flooding	DR-554-ND	April 17, 1978	April 17, 1978
16		North Dakota Severe Storms and Tornadoes	EM-3065-ND	July 7, 1978	July 7, 1978
17	**1979**	North Dakota Storms, Snowmelt, Flooding	DR-581-ND	April 26, 1979	April 26, 1979
18	**1982**	North Dakota Flooding	DR-658-ND	May 11, 1982	May 11, 1982
19	**1989**	North Dakota Flooding	DR-825-ND	May 8, 1989	March 29-May 8, 1989

#	Year	Hazard Type	Disaster Number	Declaration Date	Incident Period*
20	**1993**	North Dakota Flooding, Severe Storms	DR-1001-ND	July 26, 1993	June 22-September 24, 1993
21	**1994**	North Dakota Severe Storm, Flooding	DR-1032-ND	July 1, 1994	March 5-August 5, 1994
22	**1995**	North Dakota Severe Storm, Flooding, Ground Saturation	DR-1050-ND	May 16, 1995	March 1-July 5, 1995
23	**1996**	North Dakota Flooding	DR-1118-ND	June 5, 1996	March 12-June 21, 1996
24	**1997**	North Dakota Severe Winter Storms/Blizzards	DR-1157-ND	January 12, 1997	January 3-31, 1997
25		North Dakota Severe Storms/Flooding	DR-1174-ND	April 7, 1997	February 28-May 24, 1997
26	**1998**	North Dakota Flooding and Ground Saturation	DR-1220-ND	July 18, 1998	March 2-July 18, 1998
27	**1999**	North Dakota Severe Storms, Tornadoes, Snow and Ice, Flooding, Ground Saturation, Landslides and Mudslides	DR-1279-ND	June 8, 1999	March 1-July 19, 1999
28	**2000**	North Dakota Severe Storms and Flooding	DR-1334-ND	June 27, 2000	April 5-August 12, 2000
29		North Dakota Winter Storm	DR-1353-ND	December 29, 2000	November 1-20, 2000
30	**2001**	North Dakota Floods	DR-1376-ND	May 28, 2001	March 1-August 9, 2001
31	**2002**	North Dakota Again Fire	FSA-2435-ND	June 29, 2002	June 29-July 3, 2002
32		North Dakota Severe Storms, Tornadoes and Flooding	DR-1431-ND	September 10, 2002	June 8- 11, 2002
33	**2003**	North Dakota Severe Storms and High Winds	DR-1483-ND	August 1, 2003	June 24-25, 2003
34	**2004**	North Dakota Snow	EM-3196-ND	April 2, 2004	January 23-27, 2004
35		North Dakota Severe Storms, Flooding and Ground Saturation	DR-1515-ND	May 5, 2004	March 26-June 14, 2004
36	**2005**	North Dakota Severe Storms, Flooding and Ground Saturation	DR-1597-ND	July 22, 2005	June 1-July 7, 2005
37		North Dakota Hurricane Katrina (Evacuation Support)	EM-3247-ND	September 13, 2005	August 29-October 1, 2005
38		North Dakota Severe Winter Storm and record and/or Near Record Snow	DR-1616-ND	November 21, 2005	October 4-6, 2005
39		North Dakota Severe Winter Storm	DR-1621-ND	January 4, 2006	November 27-30, 2005
40	**2006**	North Dakota Severe Storms, Flooding and Ground Saturation	DR-1645-ND	June 5, 2006	March 30-April 30, 2006
41	**2007**	North Dakota Severe Storms and Flooding	DR-1713-ND	July 17, 2007	June 2-18, 2007
42		North Dakota Severe Storms and Tornadoes	DR-1725-ND	September 7, 2007	July 15, 2007
43		North Dakota Severe Storms and a Tornado	DR-1726-ND	September 7, 2007	August 26-27, 2007
44	**2009**	North Dakota Severe Storms and Flooding	DR-1829-ND	March 24, 2009	March 13-August 10, 2009

#	Year	Hazard Type	Disaster Number	Declaration Date	Incident Period*
45	**2010**	North Dakota Severe Winter Storm	DR-1879-ND	February 26, 2010	January 20-25, 2010
46		North Dakota Flooding	EM-3309-ND	March 14, 2010	February 26-April 30, 2010
47		North Dakota Severe Winter Storm	DR-1901-ND	April 21, 2010	April 1-3, 2010
48		North Dakota Flooding	DR-1907-ND	April 30, 2010	February 26-July 15, 2010
49	**2011**	North Dakota Flooding	EM-3318-ND	April 7, 2011	April 5-July 1, 2011
50		North Dakota Flooding	DR-1981-ND	May 10, 2011	February 14-July 20, 2011
51		North Dakota Severe Winter Storm	DR-1986-ND	May 20, 2011	April 29-May 1, 2011
52	**2013**	North Dakota Flooding	EM-3364-ND	April 26, 2013	April 22-May 7, 2013
53		North Dakota Flooding	DR-4118-ND	May 29, 2013	April 22-May 16, 2013
54		Standing Rock Sioux Tribe Severe Storms and Flooding	DR-4123	June 25, 2013	May 25-June 1, 2013
55		North Dakota Severe Storms and Flooding	DR-4128-ND	July 12, 2023	May 17, 2023-June 16, 2023
56		North Dakota Severe Winter Storm	DR-4154-ND	October 31, 2013	October 4-5, 2013
57	**2014**	North Dakota Severe Storms and Flooding	DR-4190-ND	August 19, 2014	June 25-July 1, 2014
58	**2017**	North Dakota Flooding	DR-4323-ND	July 12, 2017	March 23-April 29, 2017
59	**2019**	North Dakota Flooding	DR-4444-ND	June 12, 2019	March 21-April 28, 2019
60		North Dakota Flooding	DR-4475-ND	January 21, 2020	October 9-26, 2019
61	**2020**	Three Affiliated Tribes of the Fort Berthold Reservation COVID-19	EM-3512	March 13, 2020	January 20, 2020-May 11, 2023
62		North Dakota COVID-19	EM-3477-ND	March 13, 2020	January 20-May 11, 2023
63		North Dakota COVID-19 Pandemic	DR-4509-ND	April 1, 2020	January 20, 2020-May 11, 2023
64		North Dakota Flooding	DR-4553-ND	July 9, 2020	April 1-25, 2020
65		North Dakota Severe Storms and Flooding	DR-4565-ND	October 2, 2020	June 29-July 1, 2020
66	**2021**	North Dakota Severe Storm, Straight-line Winds and Flooding	DR-4613-ND	September 1, 2021	June 7-11, 2021
67	**2022**	North Dakota Severe Winter Storm and Flooding	DR-4660-ND	July 13, 2022	April 22-May 25, 2022
68		North Dakota Severe Winter Storm, Snowstorm, and Straight-line Winds	DR-4686-ND	February 5, 2023	November 9-11, 2022
69	**2023**	North Dakota Flooding	DR-4717-ND	July 5, 2023	April 10-May 6, 2023
70		North Dakota Severe Winter Storm and Straight-line Winds	DR-4760-ND	February 15, 2024	December 25-27, 2023

*Source: FEMA, 2023 * For the North Dakota listing, FEMA used the date of emergency and disaster declarations for the incident period prior to 1989 when the listing addressed the beginning and end of an incident.*

Since the last plan update, Governor Burgum submitted the following disaster requests, which were subsequently approved by the President:

- **North Dakota Flooding (DR-4444-ND, Incident Period March 21-April 28, 2019):** Request made for Adams, Barnes, Cass, Dickey, Emmons, Grand Forks, Grant, Hettinger, LaMoure, Logan, McKenzie, Morton, Pembina, Ransom, Richland, Sargent, Steele, Traill and Walsh counties. A very wet winter-fed ice jam on the Yellowstone and Missouri Rivers caused the first flooding, but soon the James and Red Rivers also were flooding and stayed above flood stage until April 28. The flooding caused evacuations and rescue operations, moved houses off foundations, washed out roads and caused substantial property and agricultural losses. McKenzie County had 110 displaced residents and 20 destroyed or seriously damaged homes; rescue operations in Hettinger, Adams, Sioux, and Grant counties freed residents stranded by the waters. Further east, there was more warning, and residents and officials mobilized more than 100,000 sandbags and took emergency measures to protect infrastructure including building emergency levees and pumping river water into lagoons (Burgum, 2019).
- **North Dakota Flooding (DR-4475-ND, Incident Period October 9-26, 2019):** Barnes, Dickey, Eddy, Emmons, Foster, Griggs, Grand Forks, Kidder, LaMoure, Logan, Mountrail, Nelson, Sargent, Sheridan, Stutsman, Traill, Walsh and Wells counties. A three-day storm dropped heavy rain then 30 inches of snow across a portion of the state, prematurely ending the harvest and causing more than a half-billion dollars in agricultural losses. Saturated grounds led to flooding as temperatures warmed, damaging roadways and flooding rivers for up to three weeks (Burgum, 2020).
- **North Dakota COVID-(19 EM-3477-ND, DR-4509-ND, Incident Period January 20, 2020-May 11, 2023):** Request made for all 53 counties and tribal areas. The pandemic led to the need for quarantines, social distancing and the establishment of remote business and government practices, including remote schooling and absentee voting. New or additional medical procedures were needed for contact tracing, testing sites and vaccine deployment. The impact on businesses led to substantial layoffs and income reduction, and an increase in the need for medical care that taxed existing resources (Burgum, 2020).
- **Three Affiliated Tribes of the Fort Berthold Reservation COVID-19 (EM-3512, Incident Period January 20, 2020-May 11, 2023):** Tribal Nation request for support as outlined in the paragraph above (FEMA, 2023).
- **North Dakota Flooding (DR-4553-ND), April 1-15, 2020, Incident Period April 1-25, 2020):** Requested for Barnes, Cass, Dickey, Emmons, Foster, Grand Forks, Kidder, LaMoure, Logan, McIntosh, Nelson, Pembina, Ransom, Sargent, Sheridan, Steele, Stutsman, Traill, Walsh and Wells counties. Heavy snowfall and a freeze-thaw cycle led to higher-than-normal flood crests, causing $29.7 million in damage to federal roads, threatening levees and leading to the construction of emergency floodwalls and levees. State and local roads and low-lying areas were particularly hit hard (Burgum, 2020).
- **North Dakota Severe Storms and Flooding (DR-4565-ND, Incident Period June 29 – July 1, 2020):** Requested for Benson, Grand Forks, McKenzie, Mountrail, Nelson, and Wells counties. An event exceeding a 500-year storm event flooded basements and damaged critical infrastructure. There were significant agricultural losses, and substantial damage to electrical infrastructure due to winds and lightning. Infrastructure failure was calculated to exceed $2.5 million in loss.

Winds exceeded 85 miles per hour, and Devils Lake threatened to inundate new territory (Burgum, 2020).

- **North Dakota Severe Storm, Straight-line Winds, and Flooding (DR-4613-ND, June 7 – June 11, 2021):** Request made for Burke, Divide, Emmons, Grant, Kidder, LaMoure, Sioux and Williams counties. This event produced tornados, baseball-sized hail, straight-line winds exceeding 93 mile per hour and flash floods. Persistent drought conditions contributed to the inability of land to absorb precipitation (Burgum, 2021).
- **Severe Storms and Flooding (DR-4660-ND, Incident Period April 22 – May 25, 2022):** Request made for 40 of 53 North Dakota counties that experienced at least $57 million in damage to state, local, tribal, and private non-profit infrastructure. Roads were closed and local first responders were often delayed due to unsafe weather conditions that included zero visibility from blowing snow. High winds approaching 80 mile per hour impacted areas of the state, damaging infrastructure and property. In other areas, ice was the primary culprit in infrastructure damage. Nearly all Divide County residents suffered a power outage; McLean County Water District went offline; and the Hi-Soaring Eagle Ranch, an assisted care facility for individuals with traumatic brain injuries, located south of Valley City, was evacuated when water began flowing over a bridge deck. Roads and bridges were impassable, first from snow, then from floodwaters. During the April 22-24 storm, the state received more than 25 times as much precipitation as would be expected in a 3-day period, which included 30 to 36 inches of snow, followed by two additional storms, one of which broke a 128-year-old rainfall record as part of the second wettest April in state history. The collective runoff of rain and snowmelt threatened the structural integrity of several dams due to the persistent high levels; and wastewater treatment plants were overwhelmed (Burgum, 2023).
- **Severe Winter Storm, Snowstorm, and Straight-Line Winds (DR-4686-ND, November 9 – November 11, 2022):** Request made for Dickey, Kidder, Mercer, Nelson, Ransom, Sargent, and Wells counties. Four of these counties (Kidder, Mercer, Nelson, and Wells) experienced record and near record-breaking snowfall totals, while the remaining counties suffered from significant damage to electrical infrastructure (Burgum, 2023).
- **North Dakota Flooding (DR-4717-ND, Incident Period April 10-May 6, 2023**): Request made for Barnes, Burke, Dickey, Dunn, Golden Valley, Grand Forks, Hettinger, LaMoure, McHenry, Mercer, Morton, Mountrail, Nelson, Pembina, Ransom, Richland, Sargent, Steele, Towner, Walsh and Wells counties. Heavy snowfall broke record snowfall records at 58 locations with resulting snowmelt creating significant runoff and ice jam, contributing to riverine and overland flooding (Burgum, 2023).
- **North Dakota Severe Winter Storm and Straight-line Winds (DR-4760-ND, Incident Period December 25-27, 2023):** Request made for Barnes, Cass, Dickey, Grant, LaMoure, Logan, McIntosh, Ransom, Richland, Sargent, Steele, Stutsman and Traill counties. Rain, snow and freezing rain resulted in a thick ice blanket causing extreme infrastructure damages to roads, electrical poles and lines, water systems, and other critical infrastructure (Burgum, 2024).

2.2.1.2 Governor's Emergency and Disaster Declarations

For events that do not rise to the need for federal resources but still require state mobilization, the Governor can declare a state emergency or a state disaster. This has happened seven times since 2019, including the incidents described below:

- **Winter Storm (March 13 – 15, 2019):** Severe winter weather and a blizzard impacted Foster, Grant, Kidder, LaMoure, Logan, McIntosh, McLean, Nelson, Steele, Towner and Wells counties and the Standing Rock Sioux Tribe with below 60-degree wind chills, blizzard conditions and ice storms. Stranded motorists, accidents, structural damage, and snow removal-needs led to the call for state resources to be mobilized (Burgum, 2019).
- **Civil Disturbance (May 30, 2020):** At the request of the City of Fargo, the Governor made resources available to Fargo, West Fargo, and Cass County to respond to violence that was anticipated and developed from protesting and counter-protesting in response to the George Floyd case in Minnesota (Burgum, 2020).
- **Wildland Fires (April 1, 2021):** A record season doubled the previous year's acreage burned early in the season, prompting the Governor to place state resources on alert (Burgum, 2021).
- **Drought (April 8, 2021**): With 94 percent of the state in severe drought, state resources were mobilized to address related needs (Burgum, 2021).
- **Winter Storm (March 21, 2023):** Heavy ice accumulations from freezing fog caused significant power outages and electrical infrastructure damage from the weight of ice on power lines. Persistent and atypical freezing fog persisted for much of January, reducing visibility, snapping tree branches, and creating icy conditions (Burgum, 2023).
- **Spring Flooding (April 10, 2023):** A substantially wet winter caused flooding along the Red River and its tributaries (Burgum, 2023).
- **U.S.-Mexico Border (June 13, 2023):** Declaration allowed the North Dakota National Guard to be deployed to Texas (Burgum, 2023).

2.2.1.3 USDA Disasters

The U. S. Secretary of Agriculture can designate agricultural disaster areas spanning partial state and multi-state areas down to the county level, which makes Farm Service Agency (FSA) disaster assistance and other emergency loans available directly to agricultural producers in the affected areas (FSA, 2023). USDA Secretarial Disasters, as enumerated in **Figure 2.5,** are more common than Gubenatorial or Presidential declarations. In the past 6 years there were 76 USDA Designations, with 734 component county/tribal scale designations. During the same period, there were 12 Presidential Declarations, with 268 component county/tribal scale declarations.

Unlike Presidential Disaster Declarations which require a state-level declaration and a formal

Figure 2.5: USDA Secretarial Disaster Designations affecting North Dakota by Year, 2018-2023

Crop Disaster Year	Disaster Episodes	County/Tribal Designations
2018	9	55
2019	18	181
2020	13	173
2021	19	176
2022	8	*106
2023	9	*43
Total	**76**	**734**

Source: USDA, 2023.

**Drought desianation carryover potential into CY2024*

request to the President, a USDA Secretarial Disaster Designation can be triggered when drought conditions, as reported by the U.S. Drought Monitor, meet a certain threshold. State or tribal leaders can also request a declaration when a single county or tribal nation can demonstrate a 30 percent loss of at least one crop (FSA, 2023). There are a variety of such thresholds that can be met by the variety of extreme weather and climate episodes which impact North Dakota farmers and ranchers.

Many USDA disasters have a limited geography, based on crop loss, but some may impact most or all of the state. Drought in 2021 or its near opposites of excessive rain, snow, and/or flooding in 2019 and 2020 dominated the largest USDA disasters in of the past five years, illustrating the incredible variability of North Dakota's weather and climate.

Figure 2.6: USDA Secretarial Disaster Designations in North Dakota by Hazard Type, 2018-2023

Hazard	County/Tribal Sub-Designations
Drought	372
Heavy Rain and/or Saturated Soils	394
Severe Summer Subtotal	52
Severe Winter Subtotal	249
Flooding	176
Total	***1243**

*Source: USDA, 2023. *Multiple Hazard types are possible in any one disaster designation.*

As shown in **Figure 2.6**, a breakdown of the USDA Secretarial Disaster Designations from 2018 through 2023 shows that the combination of severe summer weather and associated heavy rains had the greatest impact on agricultural production, with drought running a close second. Severe winter weather shows its impacts in either early or late (winter) season frosts, freezes, or heavy snow/ice which can delay or damage late spring crop growth and livestock or prevent a late fall harvest. Both riverine and flash flooding episodes can produce large areas of overland flooding which can delay planting, damage growing crops, or completely prevent planting due to prolonged inundated and/or saturated soils.

2.2.1.4 Non-Declared Disasters

A Presidential Disaster Declaration is obtained when the Governor of a state requests a federal disaster declaration, and the President approves it. There are times when the Governor may request a federal disaster declaration and the declaration is denied. Such was the case for a March 2023 request for a January fog and ice event that was declared a state disaster but was denied as a federal declaration. The January 2023, freezing fog and ice storm episode snapped power lines and high voltage structures causing power outages across much of northern and central North Dakota, during the coldest month of the year (Burgum, 2023). Damage assessments of $1.5 million to electrical infrastructure resulted in a state-declared disaster.

The 2021 drought created impacts beyond those anticipated from drought in North Dakota, which are typically handled through USDA Secretarial Disaster Declarations. The 2021 drought impacts included six fires exceeding 1,500 acres in size (NDDES, 2021). However, the non-agricultural damages that could be claimed and the fire damages did not result in a Presidential Disaster Declaration or Fire Management Assistance Grant (FMAG) despite their substantial impact in the state.

The Yellowstone River flooding in 2019 impacted both McKenzie County and its neighbor to the west, Richland County in Montana, highlighting the fact that disasters do not stop at borders. Flooding of the Yellowstone River closed Highway 200 and caused nine people to evacuate their homes in North Dakota (Tanner, 2019). About 110 people were displaced near the confluence of the Missouri and Yellowstone. However, infrastructure flood damages did not rise to federal thresholds for inclusion of Richland County in DR-4437-MT while McKenzie County impacts warranted inclusion in DR-4444-ND. Residential losses on both sides of the river failed to meet federal individual assistance thresholds. While people are the most impacted in disasters, damages seldom meet federal thresholds.

2.2.2 State History, Demographics and Culture

2.2.2.1 History

The first North Dakotans followed giant bison and wooly mammoths into the area at the end of the last ice age, forming hunter-gatherer societies. Eventually, these social groups split into two types of tribes. The Dakota, Assiniboine and Cheyenne were nomadic groups who relied heavily on horses to hunt bison. The Mandan, Hidatsa and Arikara Tribes formed fixed communities that relied more heavily on agriculture and trade (North Dakota Tourism, 2023). The earth lodge communities they formed, primarily along the Missouri River, became centers of trade, and now history, in the region (North Dakota Tourism, 2023).

As a political territory, the lands that would become North Dakota were important for their role in the fur trade, and several European countries claimed ownership throughout the 18th Century, with it becoming part of French territory in 1763, after time being claimed by England and Spain (Remele, 2023). It was the fur trade that first brought Natives and white people into regular contact in the area, with trade emissaries sending the first white man to the Mandan tribe in the late 18th Century. A British trading post was first established by 1801 near Pembina with other posts later established near Williston and Washburn (North Dakota Tourism, 2023). North Dakota was first claimed American territory as part of the Louisiana Purchase in 1803, and Lewis and Clark's expedition journeyed through the area not long after. Territory disputes between American and British Canadian interests would continue until the 49th parallel was established as the boundary in 1818 (Remele, 2023).

For much of the 19th Century, relations between white fur trappers, the military and the natives of the area were relatively peaceful and based on economic interaction. In the 1860s as the Dakota Territory was formed, military actions against another indigenous tribe, the Santee Dakota, soured relations between the white, primarily military, settlers and natives, and violence persisted until the arrival of the railroad tipped the scales in the 1870s, bringing ready supplies and new interest in claiming the land for farmsteads. The first farmstead in North Dakota was recorded in 1868 (Remele, 2023). This marked the transition toward agrarian lifestyles.

Near the end of the 19th Century, residents with Scandinavian, German, English, and Celtic roots quickly followed the railroad, often settling on 160-acre homesteads or bonanza (mechanized) wheat farms. Scandinavians dominated in the east and north-central areas of the state. Germans from Germany and Russia settled in the south-central area. Most of the English and Celtic immigrated from Canada and settled in the northeast area of the state (North Dakota Tourism, 2023). The cultural presence of German and Scandinavian ancestries remains strong to this day.

North Dakota became a state in 1889 after a significant population boom. The state's economy was tied heavily to agricultural success from the start and suffered from agricultural declines and severe drought in the 1920s. The state and local farmers invested heavily in agricultural infrastructure and policy incentives in the 1930s to stabilize the impacts of price fluctuations on commodities (Remele, 2023). Infrastructure, electrification, and water resources development followed the end of World War II in the 1940s. The Federal Highway System and military installations came in the 1950s and 1960s, further diversifying the economy.

Figure 2.7: Teddy Roosevelt's Maltese Cross Cabin near Medora

Source: National Park Service, 2018

During the railroad age in western North Dakota, a cattle boom hit the Badlands area, and included two ranches owned by President Theodore Roosevelt (North Dakota Tourism, 2023). Winter weather created a bit of a boom-and-bust cycle with cattle that extended until the 1960s, similar to the farm economy in much of the rest of the state. It was not just improved infrastructure, but coal mining via open-pit mines, followed by an oil boom in the western part of the state about 20 years later that contributed heavily to diversification of the economy. The majority of population growth was driven by mining in the near Bakken Formation. The Bakken formation is one of the largest contiguous deposits of oil and gas in the United States (King, 2022). The sequence of shale, siltstone and sandstone are located under the northwest portion of the state. Many North Dakotans refer to this region of the state as the Bakken, and the term will be used throughout this document.

2.2.2.2 State Demographics

2.2.2.2.1 Population

According to the 2020 U.S. Census, North Dakota has 779,094 residents with a population density of 11 people per square mile, lower than all states except Montana, Wyoming, and Alaska. Since the last plan was published in 2018, the state's population has grown at a 3.1 percent rate, as shown in **Figure 2.8**, which is significant for North Dakota though lower overall than the rate between decadal census counts.

Figure 2.8 Population Change 2018-2023

Population 2018	Population 2023	Change	Percent Growth
760,062	783,926	23,864	+3.1%

Sources: U.S. Census Bureau Quick Facts, 2023; ND Compass, 2023

In the 10-year census period between 2010 and 2020 the state had a 15.8 percent growth, the fourth highest in the nation (State of North Dakota, 2021; ND Compass, 2023). McKenzie County was the fastest growing county in the state and the nation between 2010 and 2020, with a 131.2 percent growth rate for the decade. As **Figure 2.9** shows, second place in the state was Williams County, with a growth rate of 82.8 percent. Half a dozen other counties had population growth rates in excess of 20 percent, five of which are in the Bakken-booming western half of the state (U.S. Census, 2023; ND Compass, 2023). The lone exception being Cass County, home of the state's first (Fargo) and fifth (West Fargo) most populous cities.

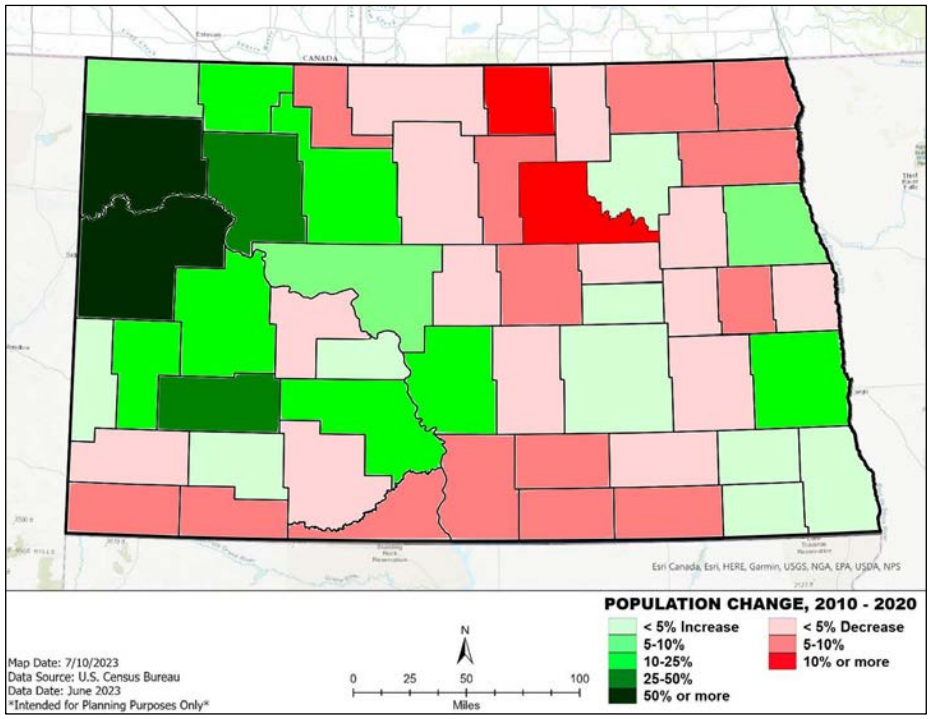
North Dakota population growth has not been uniform, with some counties growing much faster than others, and many rural central and eastern counties and many rural areas outside of larger urban centers seeing a population drop as shown in **Figure 2.9 and 2.10** (U.S. Census, 2023; ND Compass, 2023). Seven of the eight largest percentage population decreases are in the eastern half of the state, and all are in primarily agricultural counties. These eight counties experienced population losses of more than 7 percent – Rolette, Benson, McIntosh, Steele, Pierce, Pembina, Renville, and Cavalier.

Figure 2.9: County Population Change 2010-2020

Biggest Increases	
McKenzie	131.2%
Williams	82.8%
Stark	39.0%
Mountrail	27.8%
Cass	23.2%
Morton	21.2%
Burleigh	21.1%
Billings	20.7%
Biggest Decreases	
Rolette	-12.6%
Benson	-10.5%
McIntosh	-9.9%
Steele	-9.0%
Pierce	-8.4%
Pembina	-7.7%
Renville	-7.6%
Cavalier	-7.2%

Sources: US Census, ND Compass, 2023

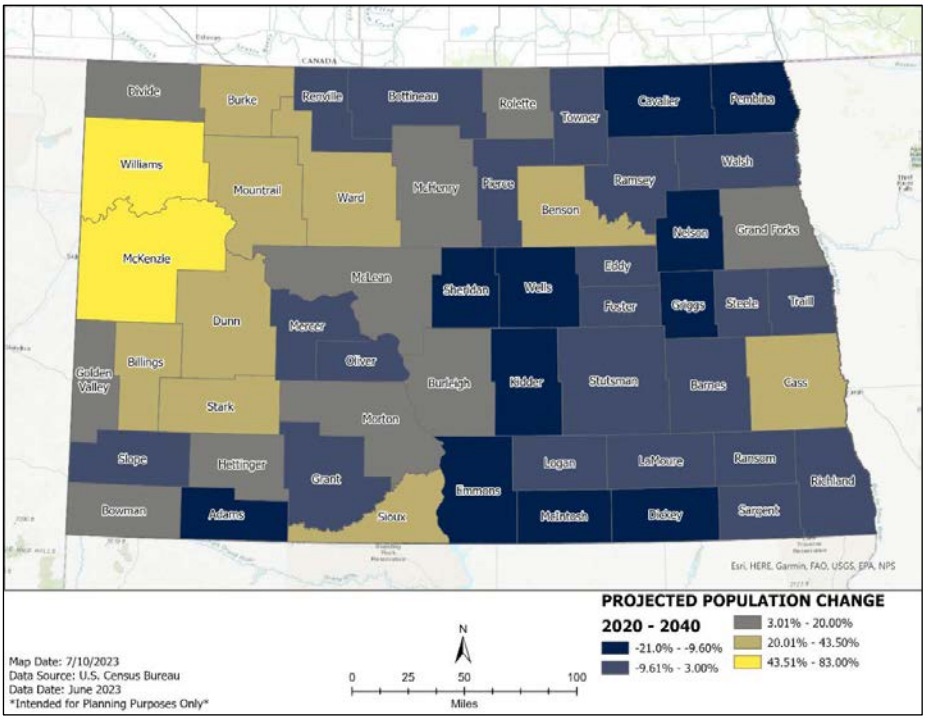
Figure 2.10: North Dakota Population Changes by County, from 2010 to 2020



Source: Yassi, 2022; U.S. Census Bureau, 2023

Figure 2.11 indicates the projected population growth from 2020 through 2040, demonstrating that population growth is expected to continue in the western part of the state.

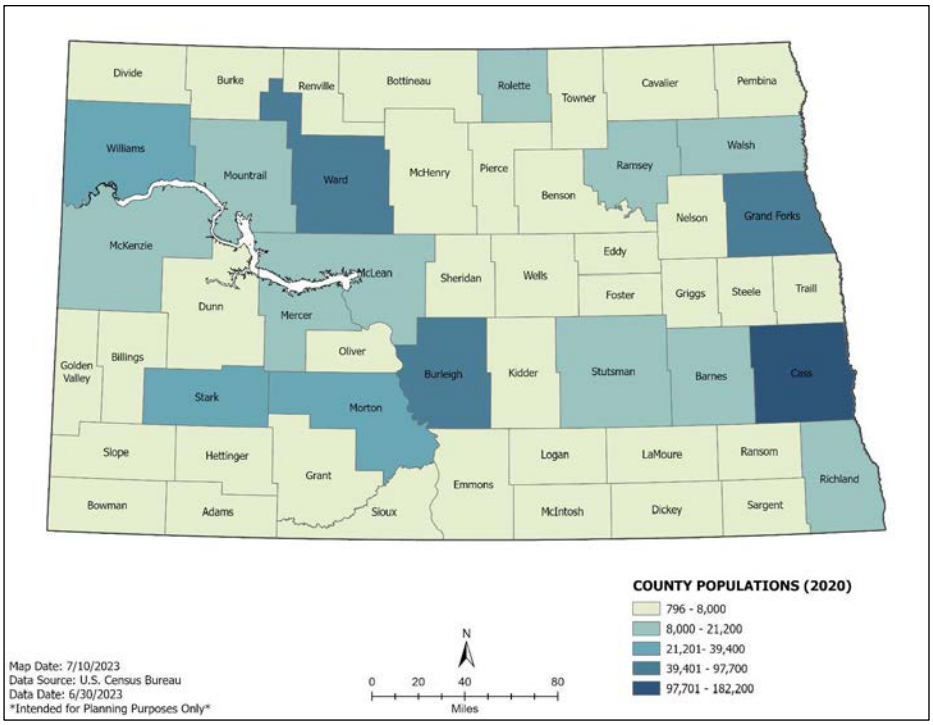
Figure 2.11: North Dakota Projected Population Change by County, 2020 – 2040



Source: U.S. Census Bureau, 2023

Cass County, where Fargo and West Fargo are located, is the only county in the state to exceed 100,000 residents based on most recent statistics (American Community Survey, 2023). Three counties have populations of between 50,000 and 100,000 – Burleigh (Bismarck), Grand Forks (Grand Forks), and Ward (Minot). Of North Dakota's 53 counties, 39 have fewer than 10,000 residents, as shown in **Figure 2.12**. Slope and Billings counties have fewer than 1,000 residents in each county.

Figure 2.12: North Dakota Population by County, based on 2020 Census Data



Source: U.S. Census Bureau, 2023

Continued growth is forecasted for the state by the North Dakota Department of Commerce, which envisions the state approaching the million-resident line around the year 2040 according to 2018 projections, as shown in **Figure 2.13** (Iverson and Cicha, 2018), and similar to the map at Figure 2.10.

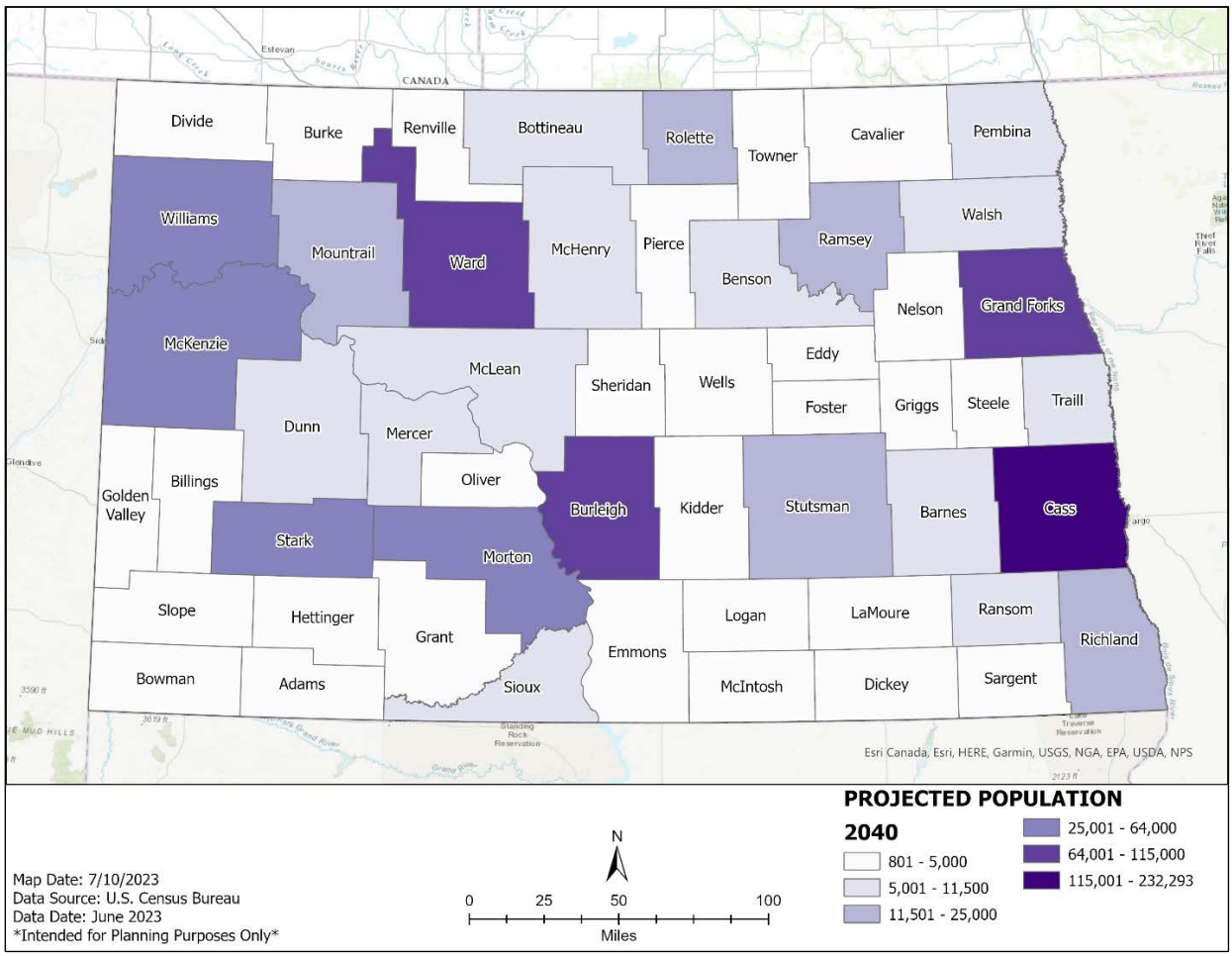
Figure 2.13: Population Projections by Economic Planning Region, 2020 through 2040

Economic Planning Region	2020	2025	2030	2035	2040
Region 1 (Williston)	56,476	69,017	78,633	86,346	93,141
Region 2 (Minot)	109,607	117,987	124,246	129,361	133,775
Region 3 (Devils Lake)	43,117	43,861	45,015	46,173	47,231
Region 4 (Grand Forks)	95,176	98,270	102,296	105,255	108,027
Region 5 (Fargo)	218,107	235,214	248,204	258,469	267,012
Region 6 (Jamestown)	55,520	54,137	53,166	52,373	51,581
Region 7 (Bismarck)	164,327	173,662	179,614	183,501	186,265
Total	**793,537**	**848,403**	**891,044**	**924,221**	**952,185**

Source: Iverson and Cicha, 2018

The distribution of population follows existing trends of urban and western development and rural and eastern losses, as shown in **Figure 2.14**. The James River Valley, Devils Lake area and Grand Forks regions all show stagnant or declining population over the next 15 years, while the Williston Region and Fargo both grow by more than 40,000 residents. (North Dakota Department of Commerce, 2018).

Figure 2.14: Map of Population Projections by County (2040)



Source: U.S. Census Bureau, 2023

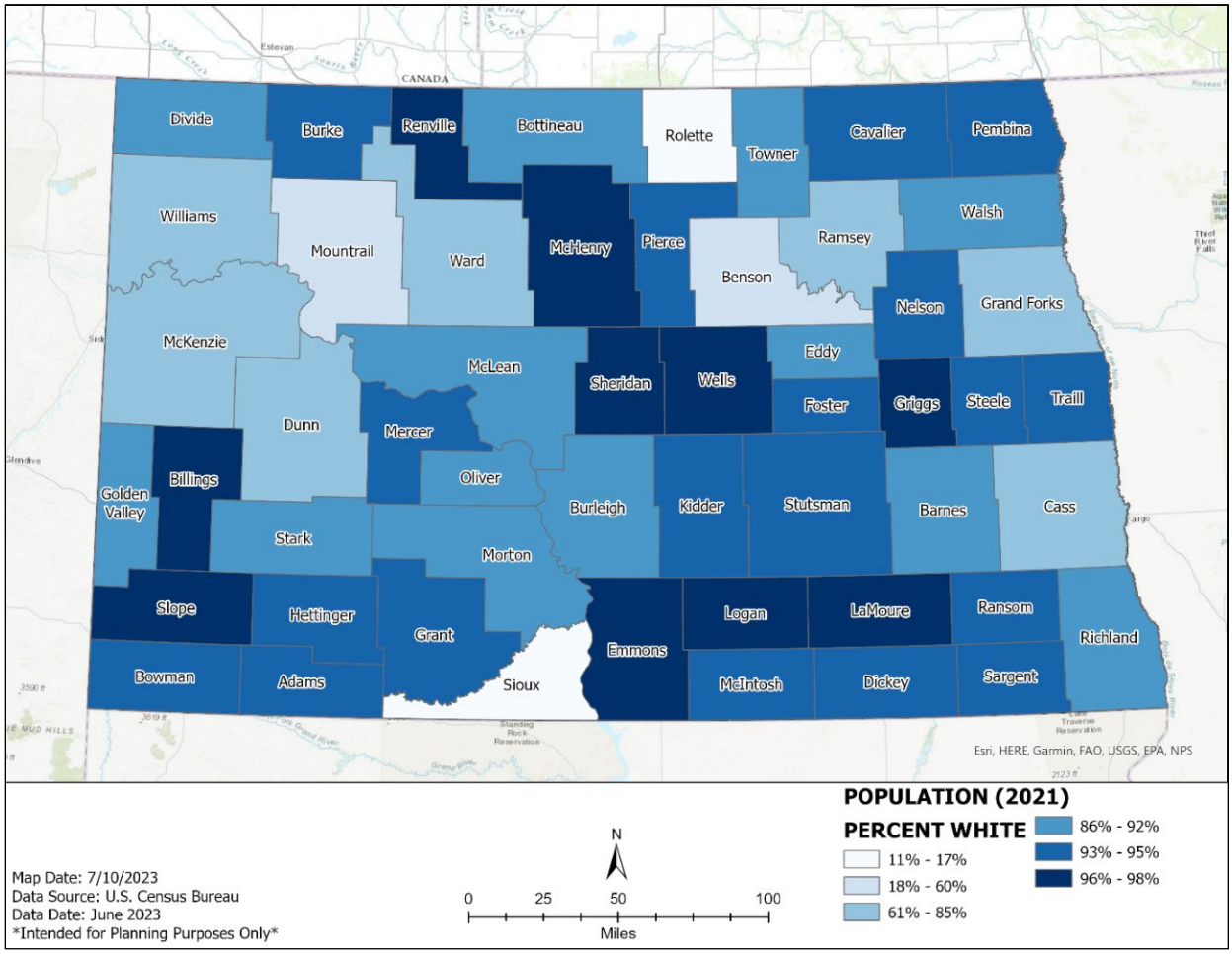
North Dakota is primarily comprised of white residents, as shown in **Figures 2.15, 2.16, 2.17, 2.18, 2.19, and 2.20**. Billings County only has white residents as identified in the most recent, 2021 American Community Survey 5-year estimates (2023). Sheridan and Slope counties join Billings in having less than two percent of the population identifying as a minority or multi-racial. Fifty of 53 counties have a white majority. The four highest minority counties all include reservations within their boundaries.

Figure 2.15: Racial/Ethnic Composition of North Dakota, 2021

Race/Ethnicity	Total	Percent	Top County (Tot)	Top County (%)
White	656,584	84.9%	Cass	Billings (100%)
Black	24,349	3.1%	Cass	Williams (4.8%)
American Indian or Alaska Native	39,103	5.1%	Rolette	Sioux (85.7%)
Asian	12,313	1.6%	Cass	Cass (3.3%)
Native Hawaiian or Pacific Islander	1,194	0.2%	Grand Forks	Grand Forks and Foster (0.5%)
Hispanic/Latino	31,926	4.1%	Cass	Walsh (12.0%)
Multiracial	29,799	3.9%	Cass	Oliver (7.0%)

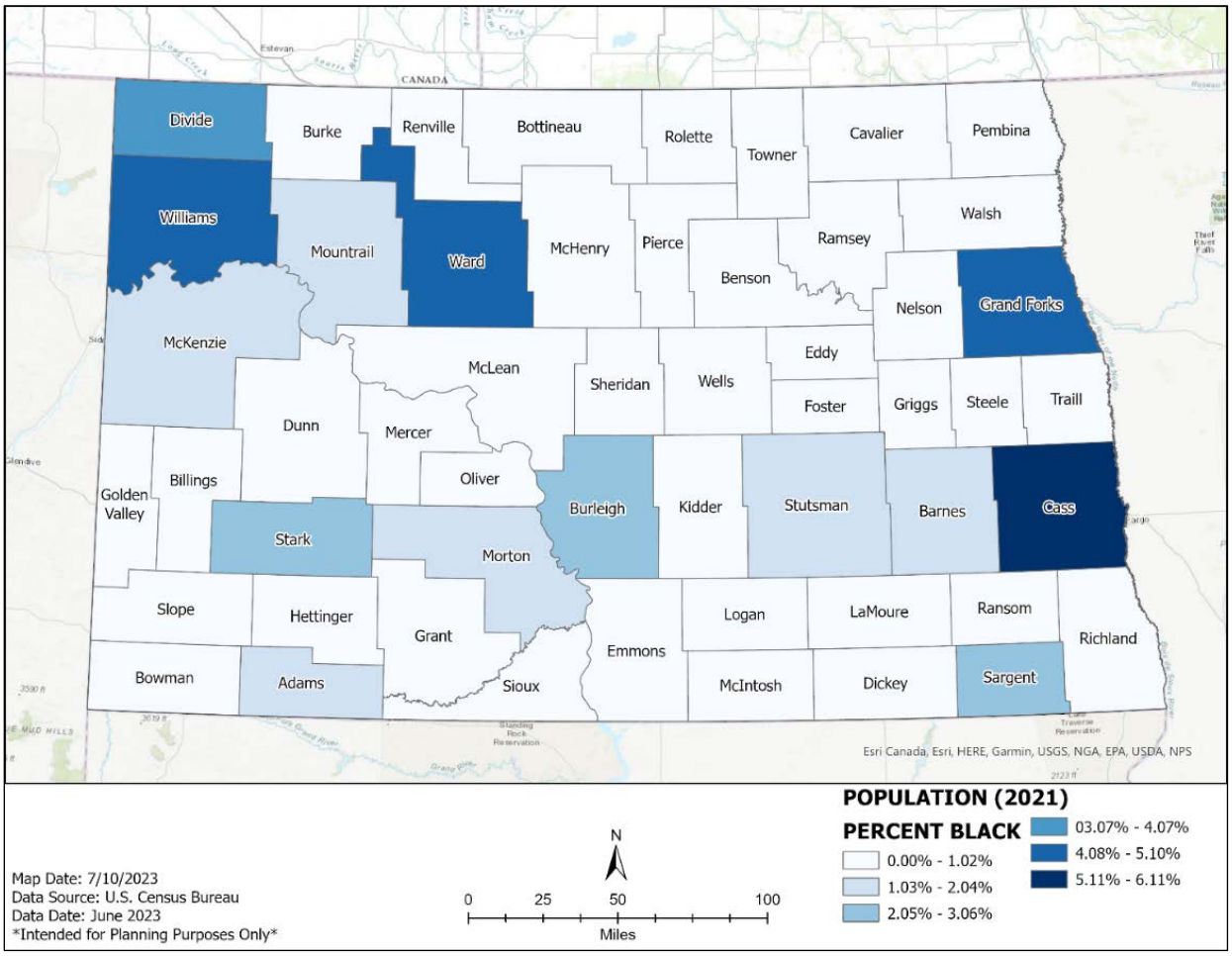
Source: American Community Survey, 2023

Figure 2.16: North Dakota White Population, 2021



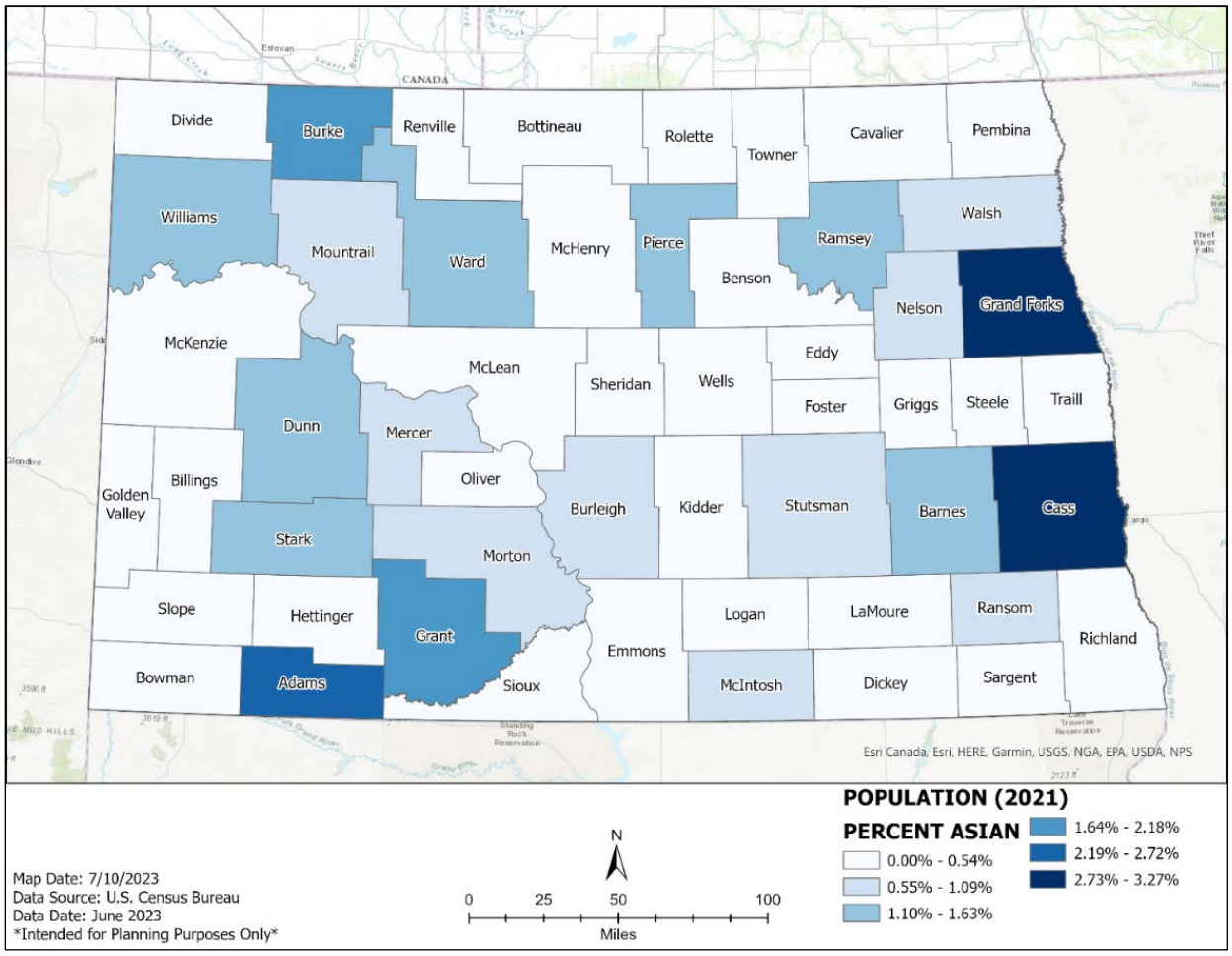
Source: U.S. Census Bureau, 2023

Figure 2.17: North Dakota Black Population, 2021



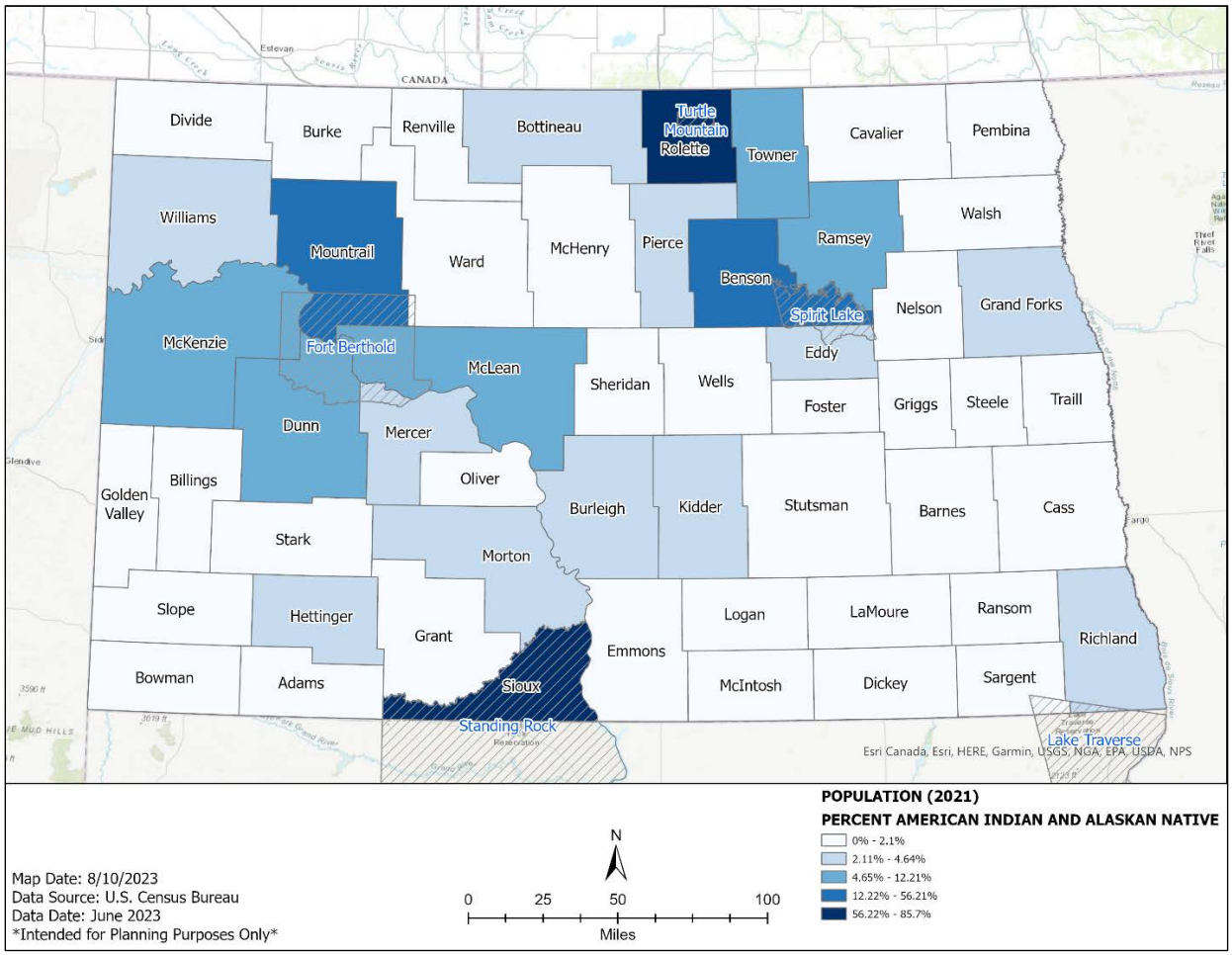
Source: U.S. Census Bureau, 2023

Figure 2.18: North Dakota Asian Population, 2021



Source: U.S. Census Bureau, 2023

Figure 2.19: North Dakota Native American Population, 2021

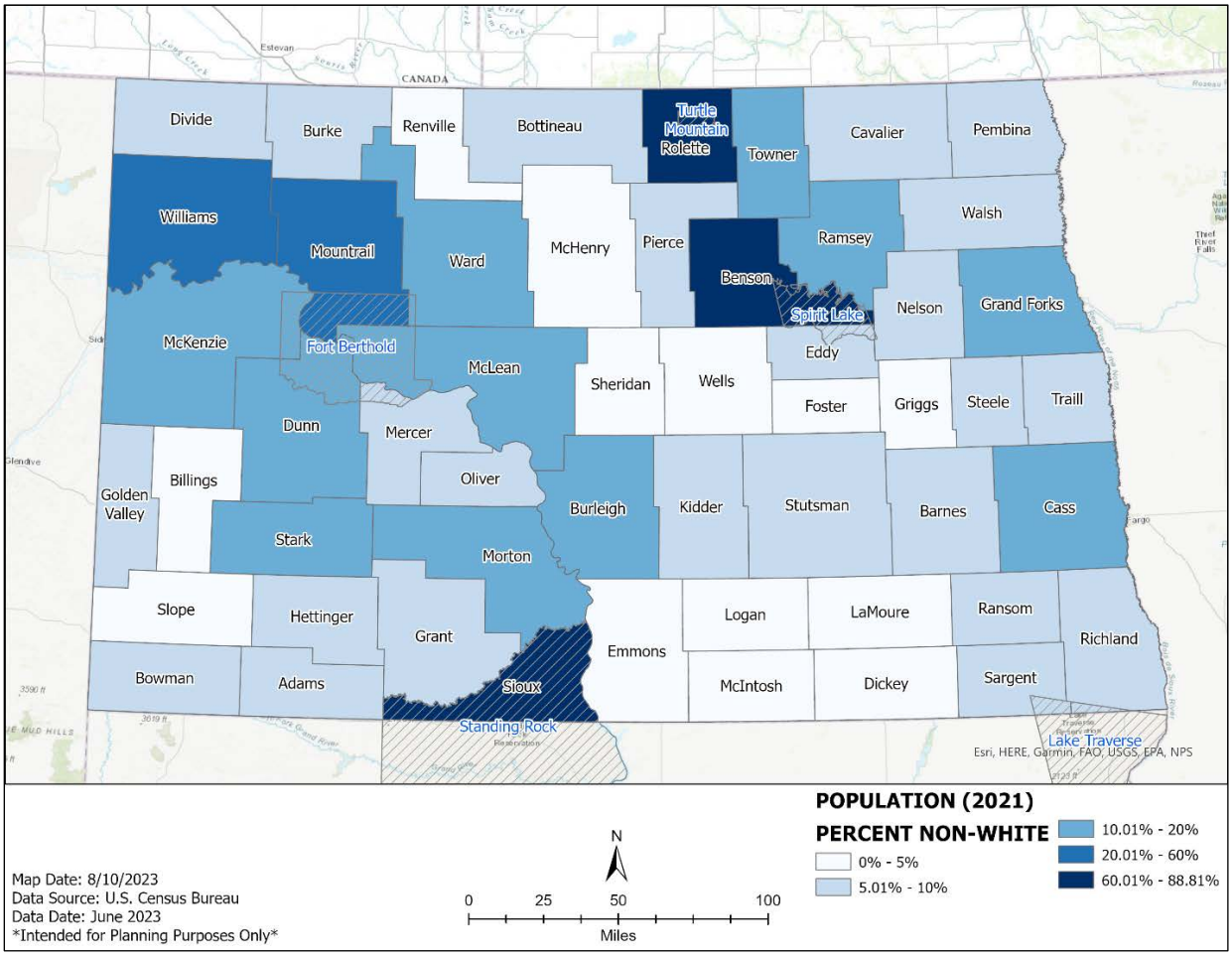


Source: U.S. Census Bureau, 2023

The second-highest ethnic group comprising the state's residents are Native Americans, who represent 5.1 percent of the state's population and are the majority in Sioux, Rolette, and Benson counties. These counties each include federally recognized Tribal lands – the Standing Rock Sioux Nation (Sioux County), the Turtle Mountain Band of Chippewa (Rolette) and the Spirit Lake Nations (Benson). Rolette County hosts the largest Native American population, but Sioux County has a higher percentage of Native Americans, who comprise the overwhelming majority (85.7 percent) of Sioux County. The Three Affiliated Tribes of Mandan, Hidatsa and Arikara tribal lands are located along the Missouri River in western North Dakota. These four Tribal Nations coordinate mitigation planning efforts and emergency response with NDDES. The Sisseton-Wahpeton-Oyate (SWO) Nation, which extends into the far southeast corner of the state, works primarily with South Dakota for hazard mitigation and emergency response. Many Native American households speak indigenous languages in their households. In addition to counties with recognized tribal lands, Burleigh, Cass, Grand Forks, Ward, and Morton counties each have at least 1,000 Native American residents (American Community Survey, 2023). Keeping traditions and culture alive through the generations is highly important and valuable to Native American households and communities.

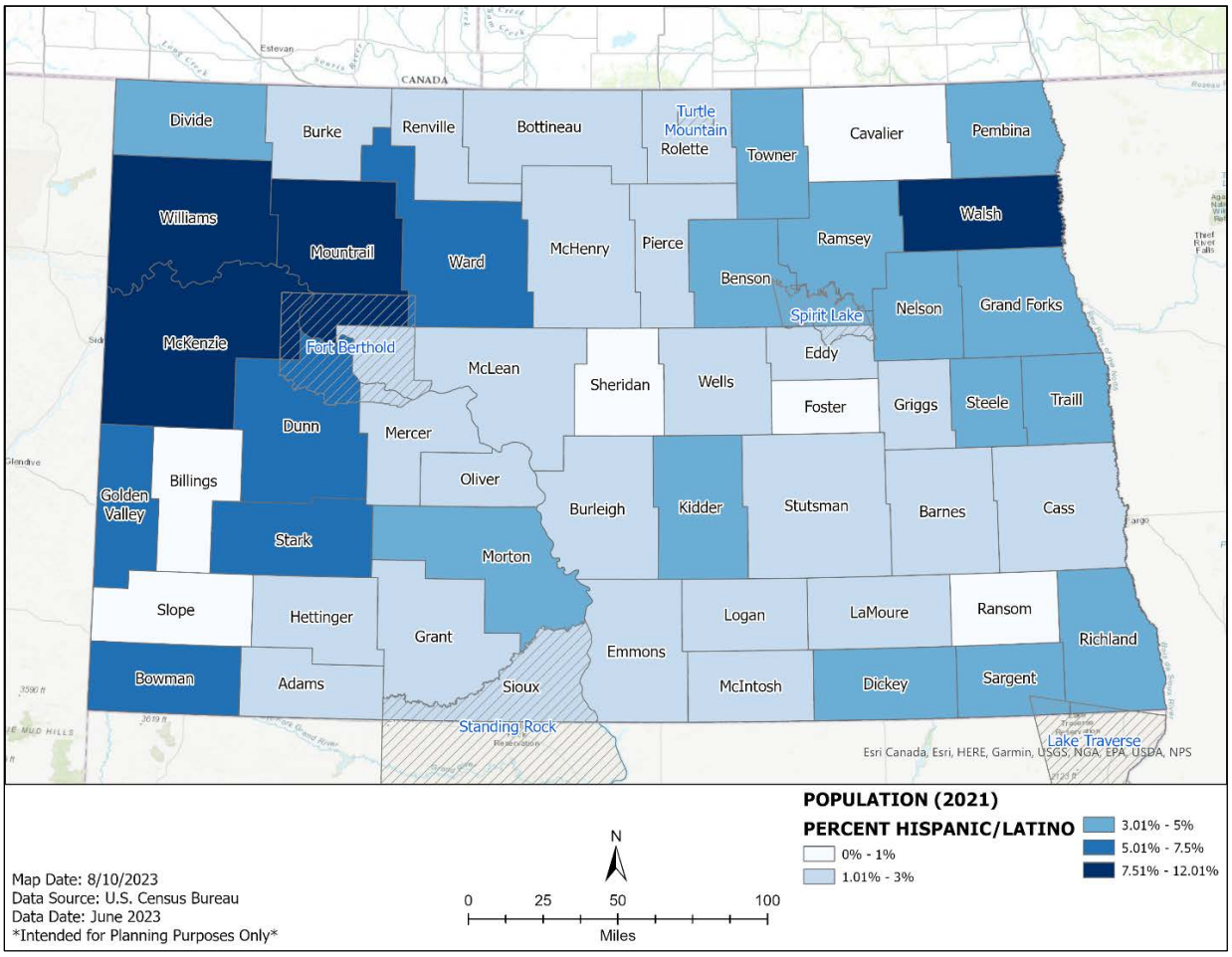
Other than the three counties that have a Native American majority, there are no other counties in which non-white populations make up the majority, even when all minority races are combined. However, urban areas like the counties of Cass (Fargo and West Fargo), Grand Forks and Burleigh, and the cities of Minot, Dickinson and Williston have notable ethnic communities. Nine counties – mostly urbanized areas – have at least 1,000 Hispanic/Latino residents, including Walsh County (12 percent) which has the highest percentage of Hispanic/Latino residents.

Figure 2.20: North Dakota Non-White Population, 2021



Source: U.S. Census Bureau, 2023

Figure 2.21: North Dakota Hispanic/Latino Population, 2021



Source: U.S. Census Bureau, 2023

2.2.2.2.2 Language

Nearly every household (98.8 percent) in North Dakota speaks English as a preferred language in the home, and just 1.2 percent consider themselves to be limited English, as shown in **Figure 2.22**. Of the 1.2 percent of households that prefer a language other than English in the home, other Indo-European Languages (2.8 percent) and Spanish (2.5 percent) were statistically tied for second when considering the margin of error (American Community Survey, 2023). Another 2.9 percent either prefer an Asian or Other Language.

Figure 2.22: North Dakota Households by Language Proficiency and Preferred Language, 2021

Total Households	Limited-English Households	Preferred Language in the Home				
		English	Spanish	Other Indo-European	Asian/ Pacific Islander	Other Language
316,542	3,953	312,589	7,802	8,983	3,614	5,667
	1.2%	98.8%	2.5%	2.8%	1.1%	1.8%

Source: American Community Survey, 2023

2.2.2.2.3 Income and Poverty

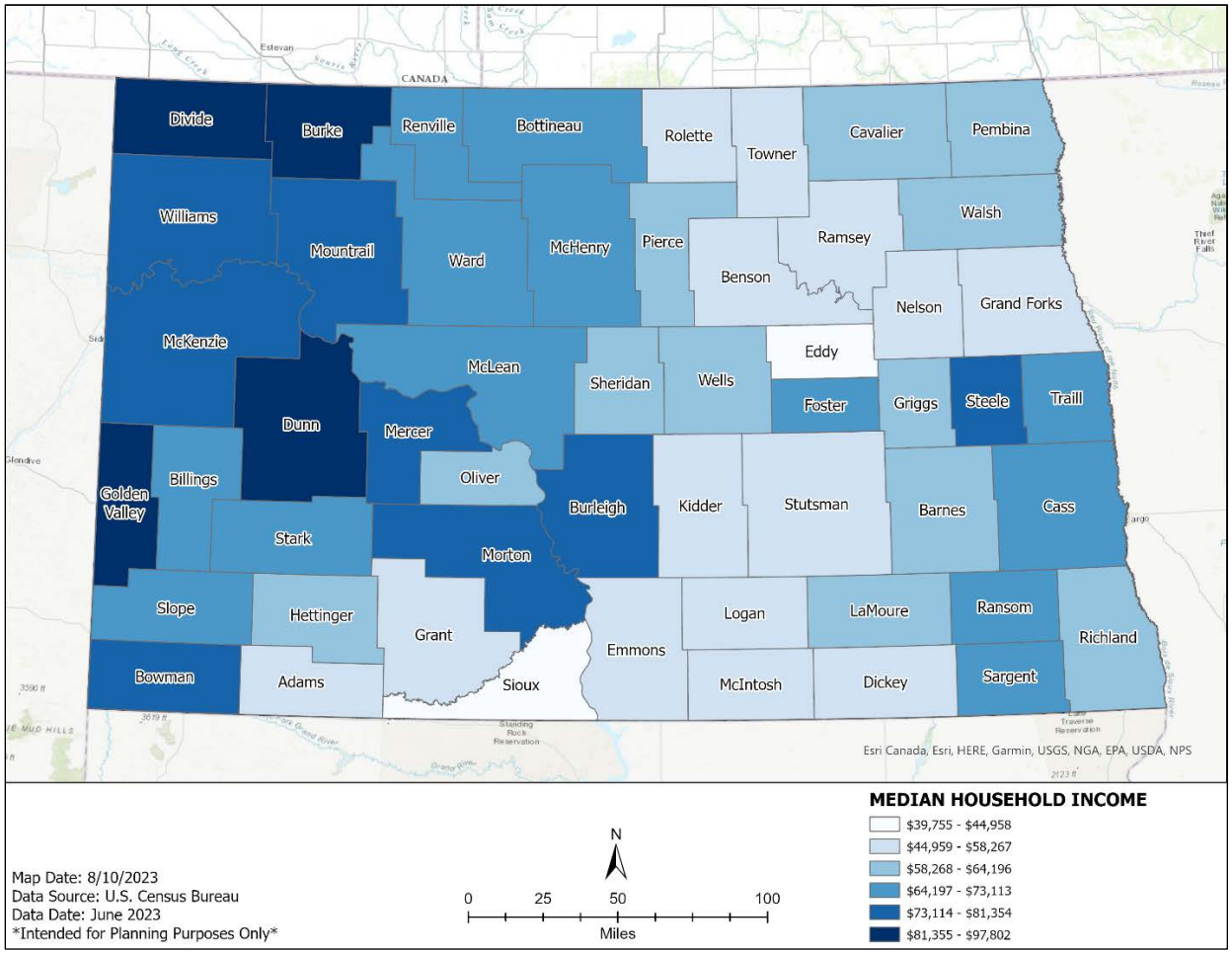
The median household income for North Dakotans is $66,519, which is slightly lower than the national average of $69,717 (American Community Survey, 2023). There are slightly more households making more than $200,000 than there are making less than $10,000 as shown in **Figures 2.23 and 2.24**. Sioux County ($39,755) has the lowest median income with more than $5,000 less in income than the next-lowest county (Eddy). Burke County ($97,802) has the highest, joining Williams, Steele, Golden Valley, Divide and Dunn counties with household medians above $80,000.

Figure 2.23: North Dakota Income Statistics, 2021

Median Household Income	Income $200,000 or more	Income Less than $10,000
$66,519	6.0%	5.6%

Source: American Community Survey, 2023

Figure 2.24: Household Income by County, 2021



Source: U.S. Census Bureau, 2023

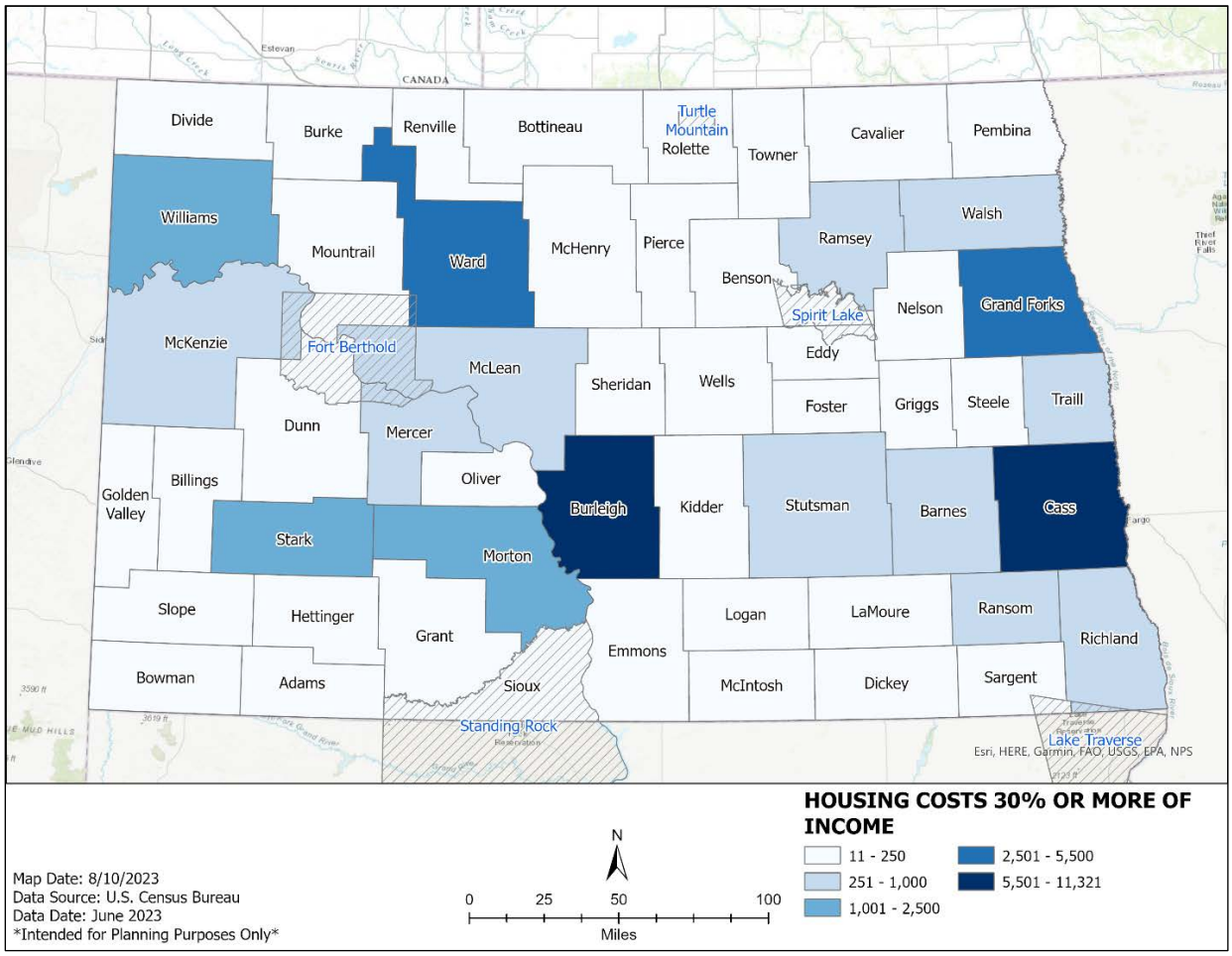
North Dakota, however, has relatively lower costs of living when compared to other states. An income of $66,000 provides a great deal more comfort than the national average earned in California or Florida. There are still households in North Dakota that struggle and for whom recovery from a disaster might be more than they can handle. **Figures 2.25 and 2.26** show households in which housing costs are 30 percent or more of household income (American Community Survey, 2023). Cass County has the highest total number of households (11,324) in which housing costs are greater than 30 percent of their income, but almost 1 in 5 households (17.0 percent) in Grand Forks County pay almost a third or more of their income for housing costs.

Figure 2.25 North Dakota Housing Costs 30 percent or More of Income

Total	41,315
Percent	13.1%
Highest Total	Cass (11,324)
Highest Percent	Grand Forks (17.0%)

Source: American Community Survey, 2023

Figure 2.26: Housing Costs 30 percent or More of Income



Source: U.S. Census Bureau, 2023

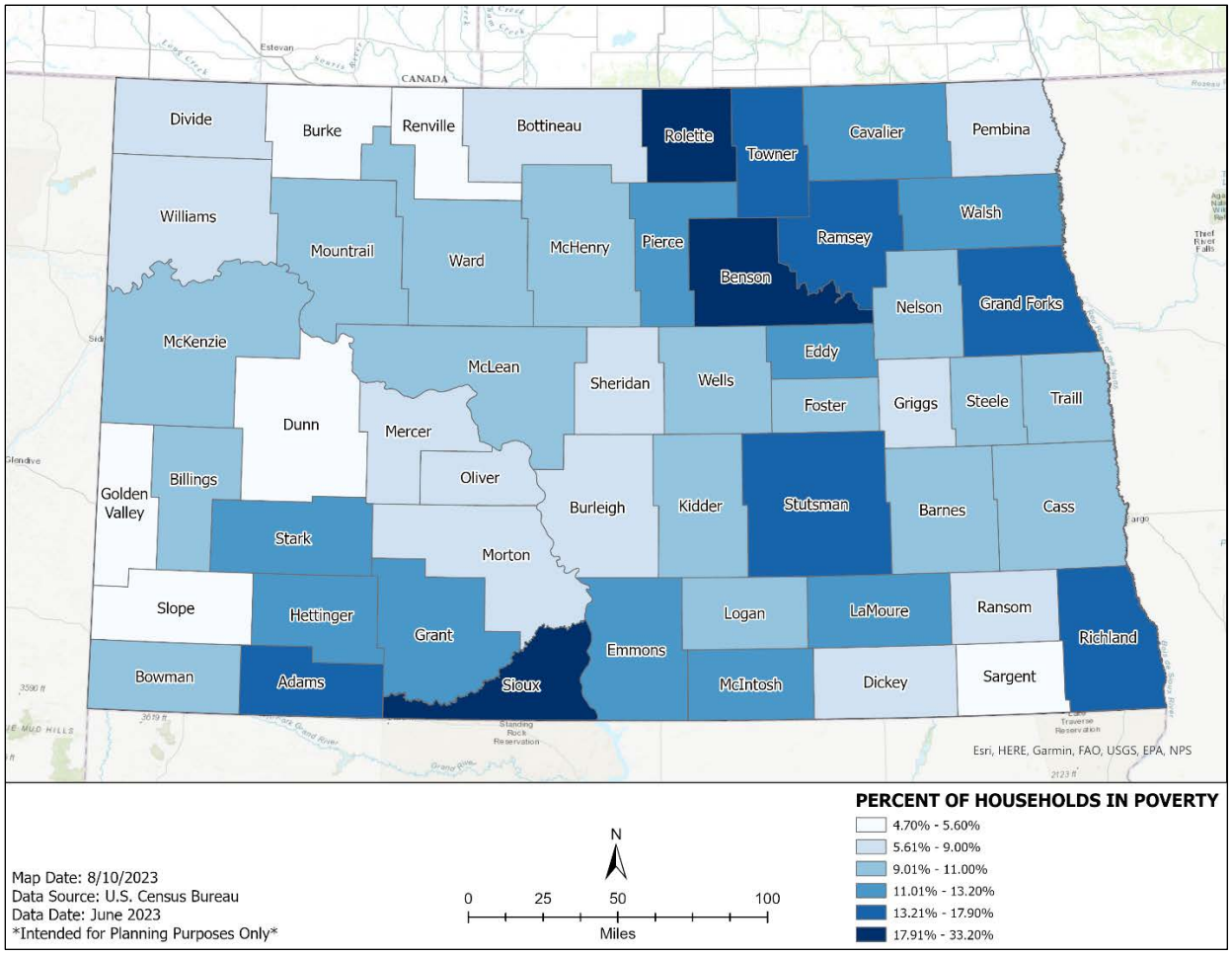
Figure 2.27: North Dakota Poverty and Food Assistance, 2021

Households in Poverty	35,650
Percent of Households in Poverty	11.3%
Highest County Poverty Rate	Sioux (33.2%)
Lowest County Poverty Rate	Renville (4.7%)
Households Receiving SNAP	20,390
Highest Total SNAP recipients	Cass (5,074)
Highest Percentage SNAP recipients	Sioux (30.6%)

Source: American Community Survey, 2023

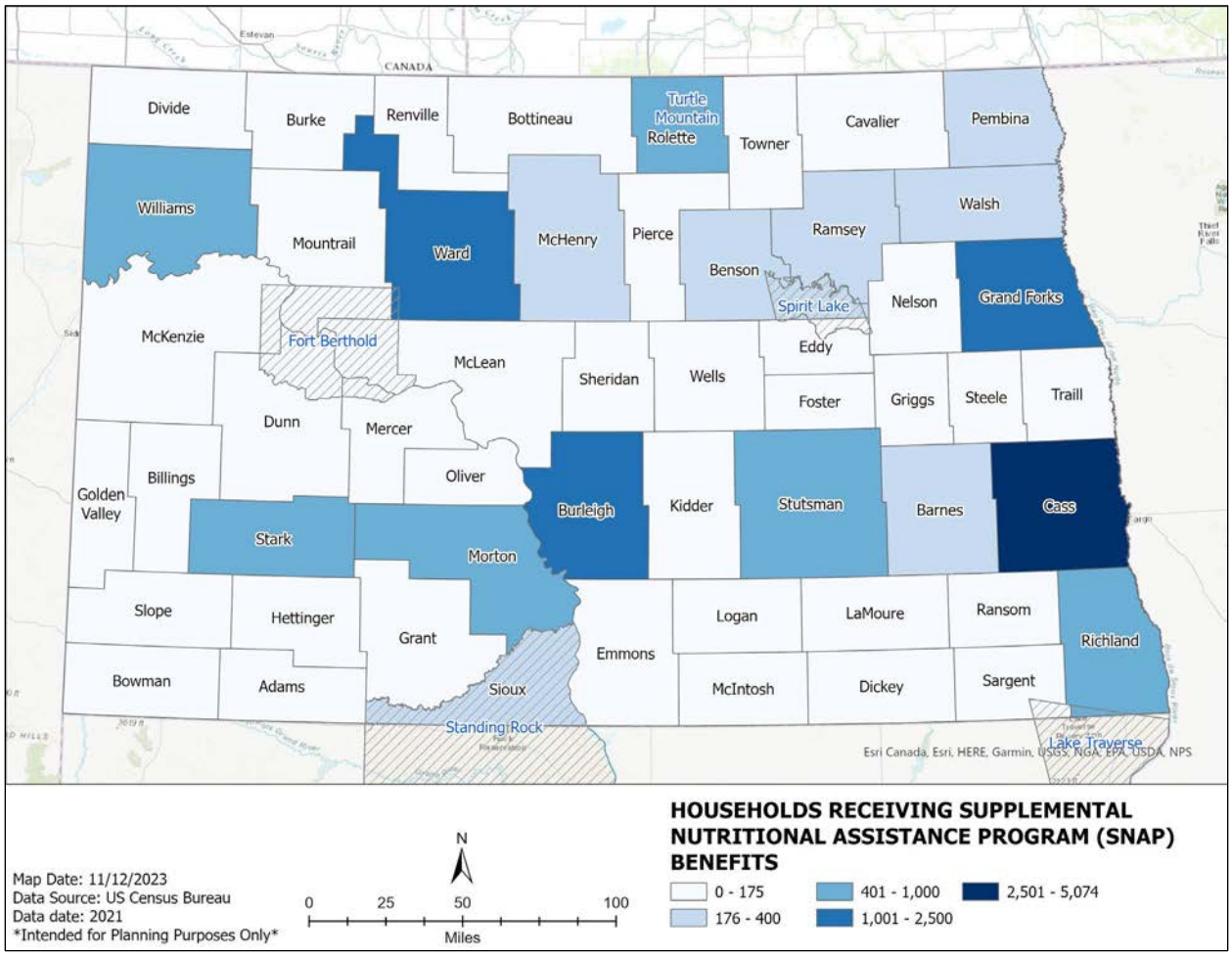
Other measures of overall social vulnerability to consider are households in poverty and households receiving benefits from the Supplemental Nutrition Assistance Program (SNAP), as shown in **Figure 2.27, 2.28 and 2.28**. In addition to having less money available to withstand the impacts of disasters, these households may be relying on unemployment and/or food assistance from the government that may be more difficult to access in the event of a disaster, especially if they are displaced. More than 1 in 10 (11.3 percent) of North Dakota households are considered impoverished, and that number is closer to 1 in 3 (33.2 percent) in Sioux County (American Community Survey, 2023). Sioux County also had the highest percentage (30.6 percent) of SNAP recipients, although 1 in 4 SNAP recipients in the state live in Cass County.

Figure 2.28: Household Poverty by County



Source: U.S. Census Bureau, 2023

Figure 2.29: Supplemental Nutrition Assistance Program (SNAP) Recipients by County, 2021



Source: U.S. Census Bureau, 2023

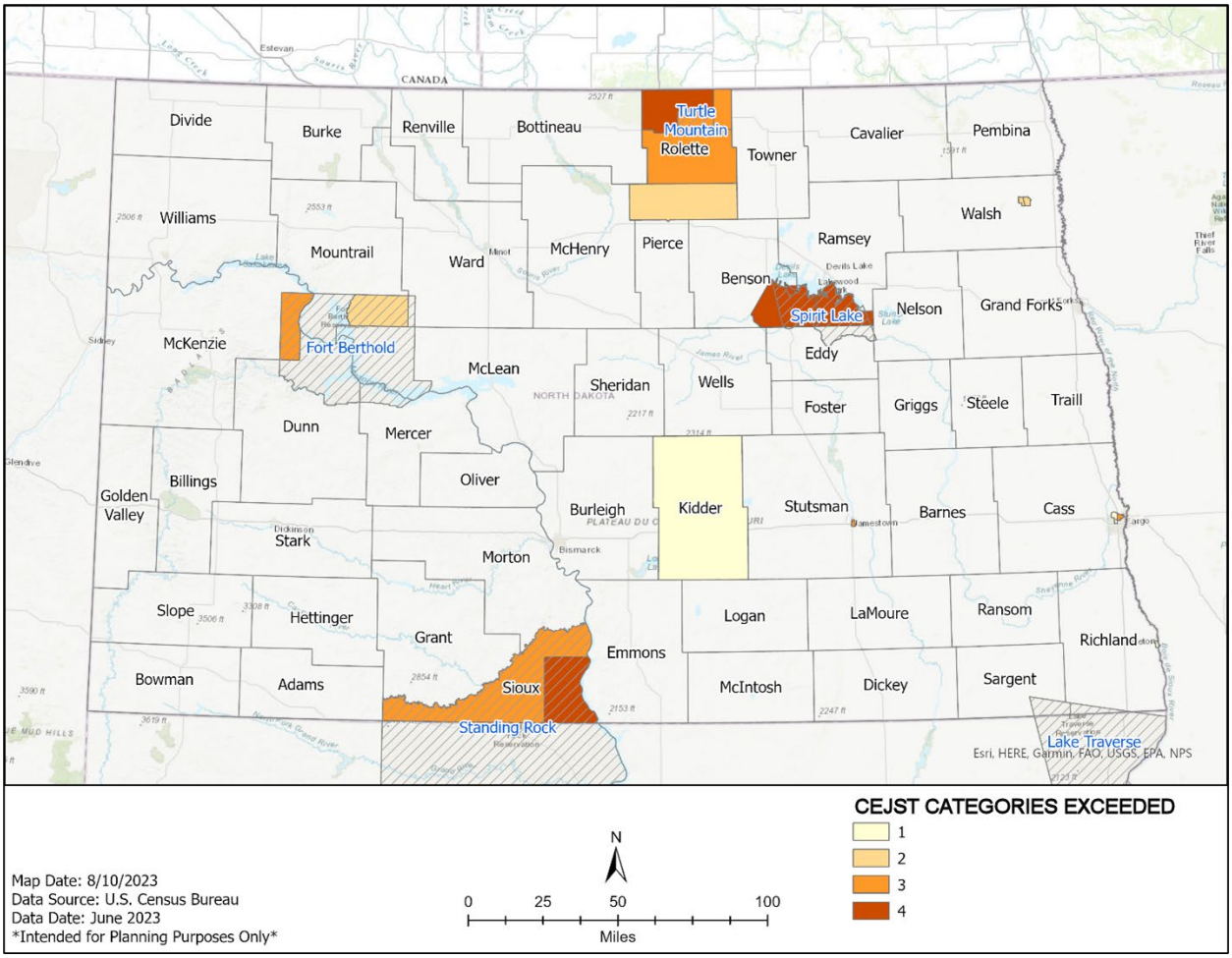
The Climate and Environmental Justice Screening Tool (CEJST) is a mapping tool that evaluated which census tracts experience burdens as considered across eight categories: climate change, energy, health, housing, legacy pollution, transportation, water and wastewater, and workforce development. Data is presented as the number of categories exceeded. North Dakota has 20 Census Tracts in which burden categories are exceeded, with four census tracts exceeding on four categories; each of these census tracts are on tribal lands. All tribal areas make the list as do some downtown urban tracts in Grand Forks, Fargo, and Jamestown, as well as a few rural areas in Pierce, Rolette, Stutsman, Kidder and Richland counties and the city of Grafton in Walsh County, as shown in **Figures 2.30 and 2.31** (Council on Environmental Quality, 2022). The CEJST was newly implemented as the vulnerability index measurement of record for Hazard Mitigation Assistance (HMA) grants at the time of writing this plan. The index evolved in response to a 2021 Executive Order and federal agencies were directed in January 2023 to begin using the tool to assist in identifying disadvantaged communities for the purpose of federal funding decisions beginning in the 2024 fiscal year.

Figure 2.30: CEJST Disadvantaged Communities, 2020

Census tract 2010 ID	County	Categories exceeded
38005940100	Benson	4
38005940200	Benson	4
38079951700	Rolette	4
38085940900	Sioux	4
38017000600	Cass	3
38035010600	Grand Forks	3
38053940100	McKenzie	3
38079941800	Rolette	3
38079951600	Rolette	3
38079951900	Rolette	3
38085940800	Sioux	3
38093967800	Stutsman	3
38061940300	Mountrail	2
38069956100	Pierce	2
38099957900	Walsh	2
38099958000	Walsh	2
38017000502	Cass	1
38017010106	Cass	1
38017010107	Cass	1
38043966800	Kidder	1
38077971000	Richland	1

Source: Council on Environmental Quality, 2023

Figure 2.31: Map of Climate and Environmental Justice Screening Tool (CEJST) Disadvantaged Communities, 2020



Source: U.S. Census Bureau, 2023; CEJST, 2023

The Centers for Disease Control and Prevention and Agency for Toxic Substances and Disease Registry (CDC/ATSDR) have developed a metric called the Social Vulnerability Index (CDC SVI) that compares the relative vulnerability of one Census Tract or county to others. It defines social vulnerability as "the potential negative effects on communities caused by external stresses on human health. Reducing social vulnerability can decrease both human suffering and economic loss" (CDC/ATSDR, 2023). **Figures 2.32 and 2.33** give more information about North Dakota County scores.

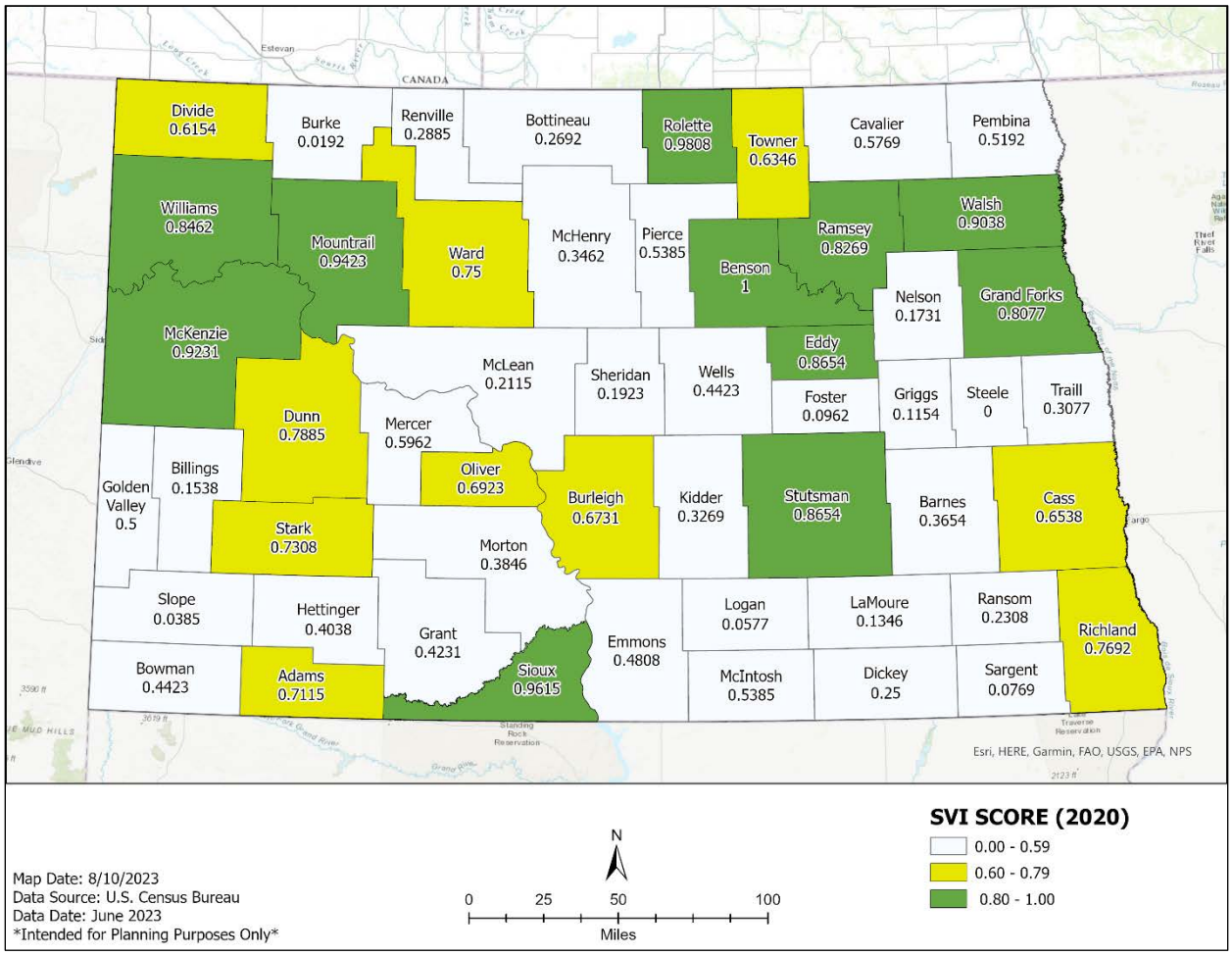
In addition to providing a metric for discussing the relative ability of a community to weather the impacts of disaster, HMA programs such as Building Resilient Infrastructure and Communities (BRIC) and Flood Mitigation Assistance (FMA) used these scores to determine cost-share match and for ranking applications until FY 2022, providing cost-share breaks and assistance to communities scoring 0.8 or more. Additionally, communities with a score of 0.6 or more received more weight in funding decisions. This data can be used to help communities prepare for emergencies in advance by helping them better estimate the needs for shelters, accommodations for special needs, and food and financial assistance needs. The CDC SVI score is calculated using a variety of census measures including poverty, unemployment, housing burden, education, health insurance, age, disability, household structure, race, English proficiency, housing types, and access to vehicles (CDC/ATSDR, 2023).

Figure 2.32 Highest North Dakota CDC Social Vulnerability Index Scores, 2020

County	CDC SVI Score
Benson	1
Rolette	0.9808
Sioux	0.9615
Mountrail	0.9423
McKenzie	0.9231
Walsh	0.9038
Eddy	0.8654
Stutsman	0.8654
Williams	0.8462
Ramsey	0.8269
Grand Forks	0.8077
Dunn	0.7885
Richland	0.7692
Ward	0.75
Stark	0.7308
Adams	0.7115
Oliver	0.6923
Burleigh	0.6731
Cass	0.6538
Towner	0.6346
Divide	0.6154

Source: CDC/ATSDR, 2020

Figure 2.33: CDC/ATSDR SVI Scores by County



Source: U.S. Census Bureau, 2023

Figure 2.34: Lack of Access to Transportation, 2020

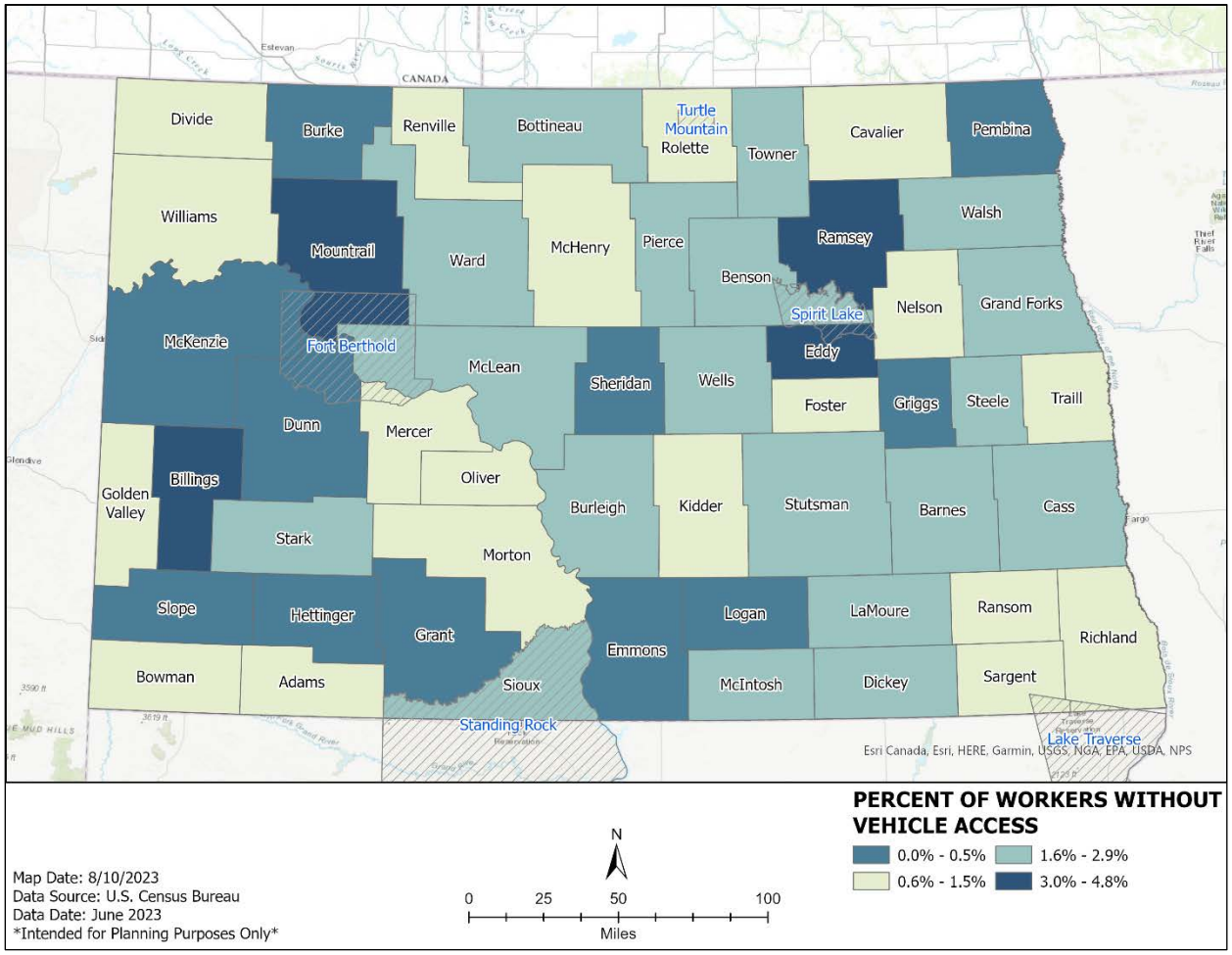
Workers without Access to a vehicle	7,767
Workers without Access to a Vehicle or Routed Transit	2,583
Highest Population without Vehicle Access	Cass (2,441)
Highest Population without Vehicle Access/Routed Transit	Stark (455)

Source: American Community Survey, 2023

Especially in a rural state like North Dakota, lack of access to transportation can isolate and limit a household economically and make evacuation and relocation challenging during and after disasters. At least 7,767 North Dakotans do not have access to a vehicle, and of those, more than 2,500 also lack access to transit services to get them where they need to go, as shown in **Figure 2.34** (American Community Survey, 2023). Such residents would be reliant on family, friends, neighbors, or a car service if they needed to evacuate. They would be less capable of changing jobs or relocating should a disaster require it. **Figure 2.35** shows the number of workers without access to a vehicle by county. Urban areas have the most workers without access to a car, and these areas typically have routed transit that can

help residents get to jobs, but that may be unavailable during a disaster, and incapable of taking a household member to a hospital or away from encroaching floodwaters. Stark County has the largest population (455) without access to a vehicle or transit, but there are four rural counties where more than 3 percent of the population does not have access to a car or transit – Billings, Eddy, Mountrail, and Ramsey (American Community Survey, 2023). Lack of accessible transit can pose a challenge to many underserved populations including but not limited to, rural communities, disabled, elderly, socially isolated, NFI, etc.

Figure 2.35: Workers without Access to a Vehicle, 2020



Source: U.S. Census Bureau, 2023

The U.S. Department of Transportation conducted a 2018 study that examined the ability of rural residents, regardless of county, to access inter-city transportation. It looked at the distance to commercial airports, inter-city bus service and inter-city rail service. The areas with more than 5,000 rural residents who do not have such access are shown in **Figure 2.36**. While most are in small rural counties, there are several western counties with growing populations that meet these criteria, including McKenzie, Mercer, and McLean, which can all be impacted by Missouri River flooding.

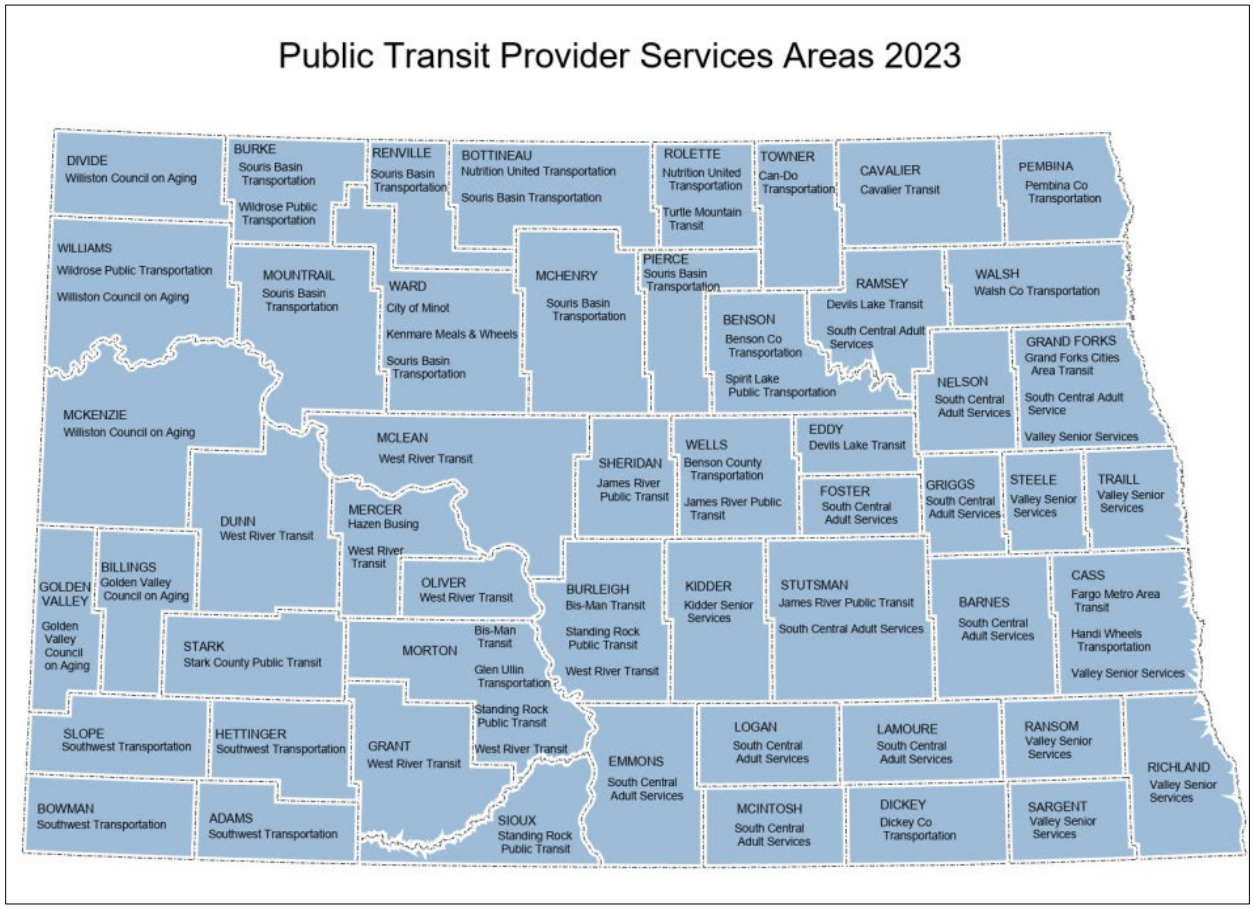
Figure 2.37 shows which primary transit agency provides service to which counties. While larger communities may have routed transit routes serviced by buses, many rural areas have one or more cars that provide service on call for a fee within the service area.

Figure 2.36 Rural Population Without Access to Inter-City Transportation, 2018

County	No Access to Transportation
Rolette	12,418
McKenzie	11,050
McLean	9,608
Walsh	8,255
Mercer	7,854
Richland	7,437
Pembina	7,016
Bottineau	6,589
Traill	5,634
Ransom	5,361

Source: Bureau of Transportation Statistics, 2020

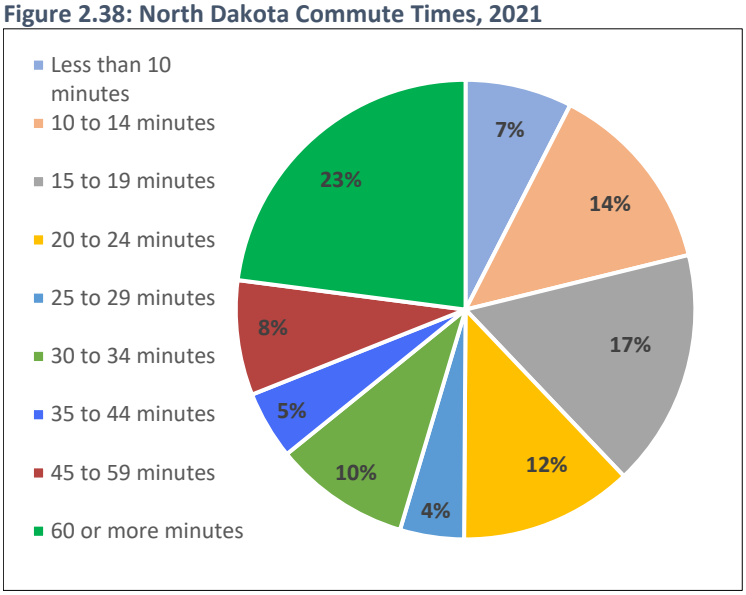
Figure 2.37: Transit Providers in North Dakota



Source: ND Department of Transportation

Commuters have their own vulnerabilities related to being on roads during high-traffic periods. Hazards can adversely impact roadways and expose commuters to harm. **Figure 2.38** shows commute times for North Dakotans.

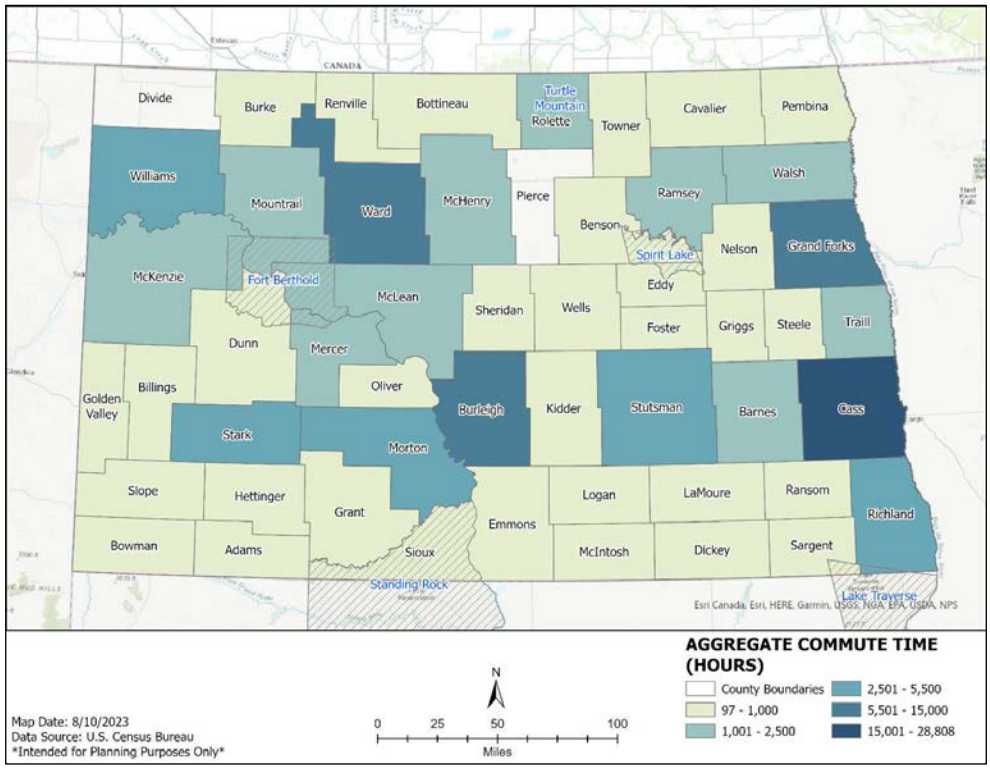
Figure 2.38: North Dakota Commute Times, 2021



Source: American Community Survey, 2023

Figure 2.39 shows the aggregate commute time for each county, which is the number of minutes each worker living in the county commutes added together. Nearly a quarter (23 percent) of North Dakotans spend more than 60 minutes each workday commuting. Just 7 percent have a commute less than 10 minutes. This means there is a lot of road exposure daily for North Dakota workers, and the condition and accessibility of roads can limit their ability to get to and from work; therefore, road conditions can impact economic productivity in the state. Proportionally, Renville and Sheridan counties have more than half of their workers on the road for an hour or more (American Community Survey, 2023). Conversely, Foster, Bowman and Ramsey counties have the most workers with less than 10 minutes of commuting.

Figure 2.39: Aggregate Commute Time by County, 2021



Source: American Community Survey, 2023

While commuting may provide a behavioral vulnerability, there are several aspects of social vulnerability that can put North Dakotans at risk for hazards or can make personal and emergency response more challenging. The elderly, children, and many other populations can be more susceptible to health impacts from hazards such as extreme heat, extreme cold and wildfire smoke that can be exacerbated by the inability to travel away from the hazard. They can also be more likely to have life-threatening impacts from infectious disease (Mayo Clinic, 2023)

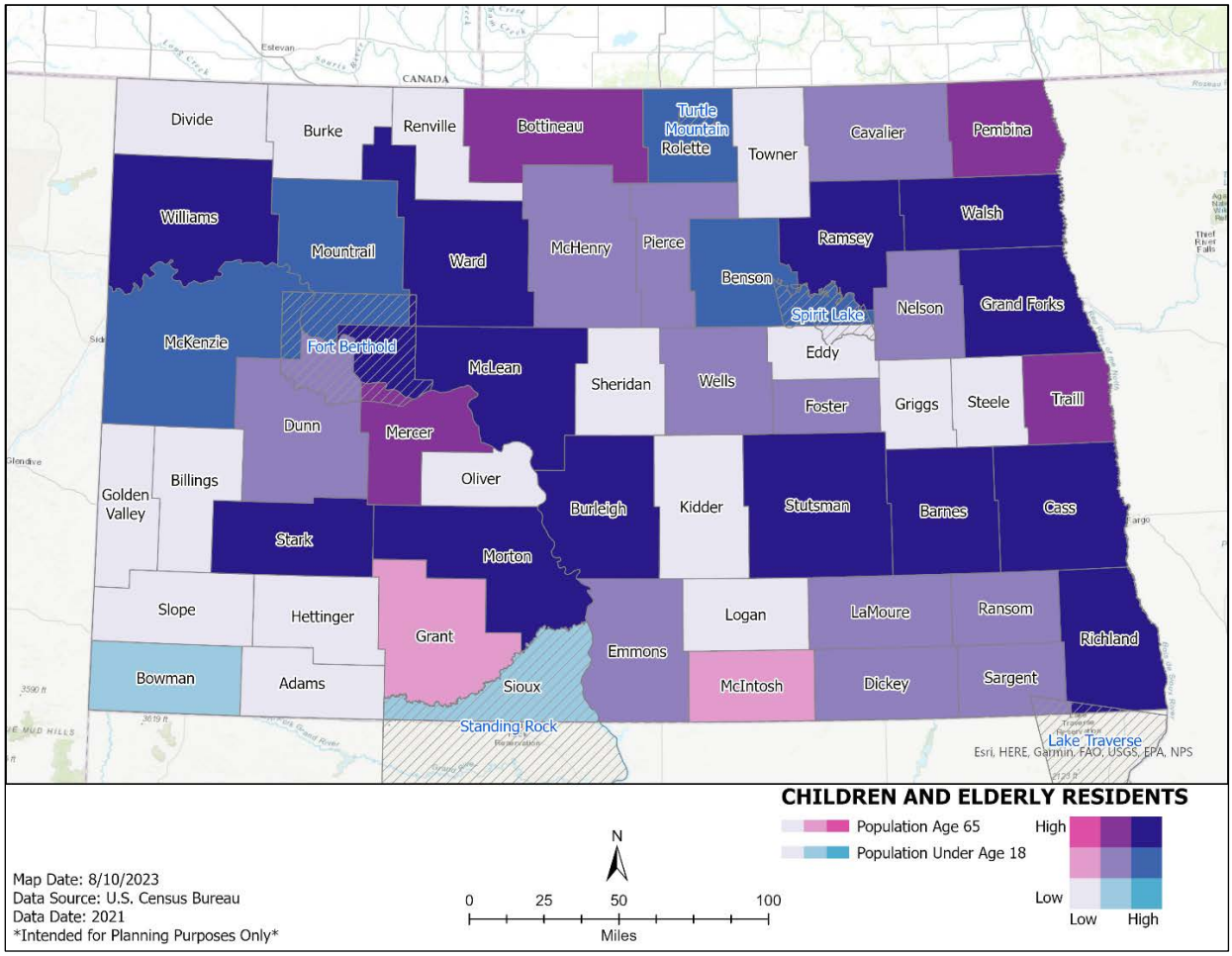
Figure 2.40: Elderly and Minor Children Households, 2021

Households with residents 60 or older	111,828
Percent of Households with residents 60 or older	35.3%
Highest rate of 60 or older residents	Sheridan (59.3%)
Households with minor children	88,184
Percent of households with minor children	27.9%
Highest rate of minor children	Benson (37.8%)

Source: American Community Survey, 2023

The elderly or chronically ill are more likely to be on necessary medication, which can provide challenges when roads are closed or damaged from severe winter weather, landslides, or flooding. Elderly residents may also need more assistance in recovering from disasters, such as struggles with snow clearance or cleaning flooded properties. **Figure 2.40** shows characteristics of age-related vulnerability populations, which are also shown by county in **Figure 2.41**. There are about 65,000 more North Dakotans over the age of 65 (184,458) than there are residents under the age of 18 (118,198), (American Community Survey, 2023). There are about 50,000 children under the age of 5 in the state and 17,000 over the age of 85. These residents often experience daily challenges positioning them as some of the most vulnerable to hazards.

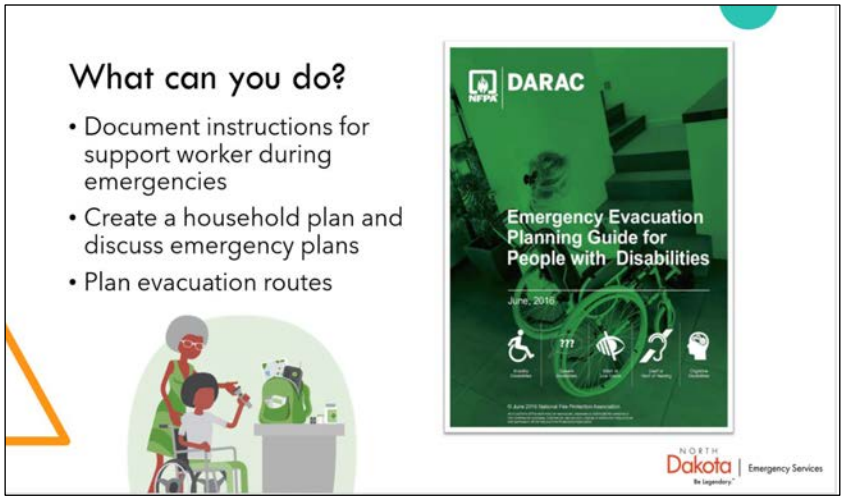
Figure 2.41: Children and Elderly Residents, 2021



Source: American Community Survey, 2023

Disability can provide challenges for evacuation and sheltering, as well as response and recovery. Physical disability, much like with the elderly, can impair a person's ability to clear snow or clean a flooded property. Some disabled residents cannot easily live on their own and need help with self-care, and/or may struggle with changes in routine or in a shelter situation. Sensory and/or cognitive disability may provide challenges with emergency messaging and reception.

Figure 2.42: State Resource for Disabled Residents



Source: North Dakota Department of Emergency Services, 2023

Figures 2.43 and 2.44 show characteristics of the disabled population in North Dakota and the geographic distribution. Disabled residents may rely on access to assistive technologies that may not be available in a shelter. Shelters and safe rooms may need to be accessible to serve some disabled residents.

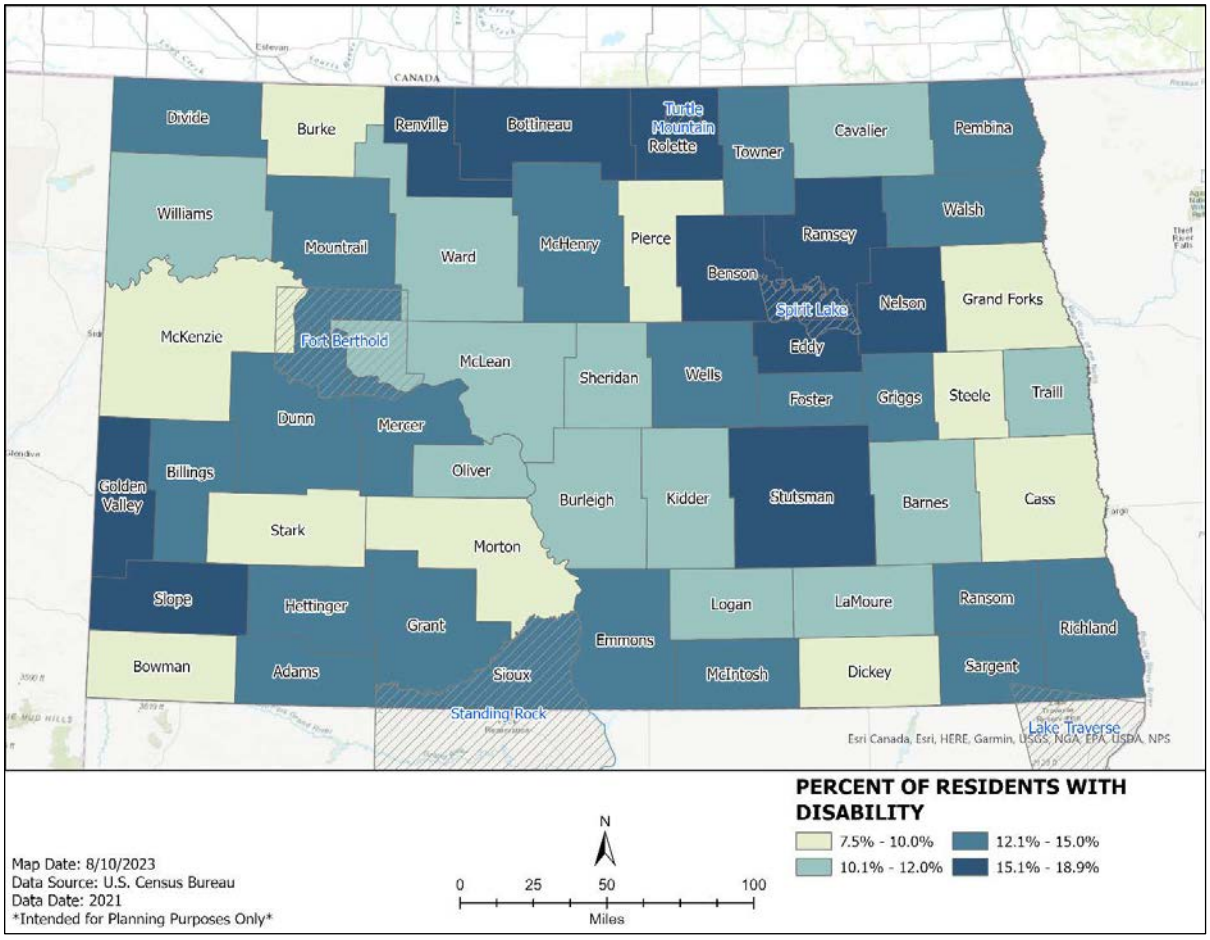
Figure 2.43: Disability Characteristics, 2020

Residents with a Disability	81,010
Percent of Residents with a Disability	12.7%
Highest Disability Rate	Nelson (18.9%)
Residents with Hearing Difficulty	27,655
Residents with Vision Difficulty	14,501
Residents with Cognitive Difficulty	29,068
Residents with Ambulatory Difficulty	34,960
Residents with Self-Care Difficulty	11,660
Residents with Independent Living Difficulty	22,715

Source: American Community Survey, 2023

The elderly and disabled may also be more reliant on social security and disability income, and thus may have fewer resources available to self-shelter or to recover from the impacts of disaster. Nelson County has the highest disability rate, but it is one of 10 counties with rates equal to or greater than 15 percent of residents with disabilities.

Figure 2.44: Disabled Residents, 2021



Source: American Community Survey, 2023

During a community outreach session through the Minot State University, Center for Persons with Disabilities staff highlighted the variety of support networks and gaps in services that exist for the disabled across the state. Transportation and sheltering of those with functional needs is challenging during evacuation. Staff and those within the outreach event shared stories of the challenges that were faced for the community during recent disasters. These disparities are expanded upon during disasters and in day-to-day living.

Members of social or racial groups that commonly experience harassment can feel unsafe in shelters or in areas where recovery resources are distributed. Members of the LGBTQ2S+ (Lesbian, Gay, Bisexual, Transgender, Queer, Questioning and Two-Spirit) community may face discrimination or harassment or may fear that they will. They also may face challenges related to maintaining their household structure or having their families recognized as such. According to the Williams Institute (2019), while North Dakota has the lowest percentage (2.7 percent) of LGBTQ2S+ (Lesbian, Gay, Bisexual and Transgender) residents in the nation, this population is younger, more likely to be impoverished, and less likely to be unemployed, as shown in **Figure 2.45**.

Figure 2.45: LGBT Population Overview, 2019

Percentage of Population	2.7%
Average Age	37.7
Percentage with Children	10.0%
Percentage in Poverty	23.0%
Percentage Unemployed	1.0%
Percentage Uninsured	13.0%
Percentage Food Insecure	15.0%

Source: Williams Institute, 2019

One in 10 LGBTQ2S+ residents have children (Williams Institute, 2019). During a Community Coffee with the ND Department of Health and Human Services (NDHHS) BeYOU Advisory Group, in the fall of 2022, members of the LGBTQ2S+ community highlighted many challenges that they face. These challenges include housing and employment instability with concern for receiving equitable and quality healthcare. They also worried about shelter accommodations. Challenges such as these can be magnified during times of disaster.

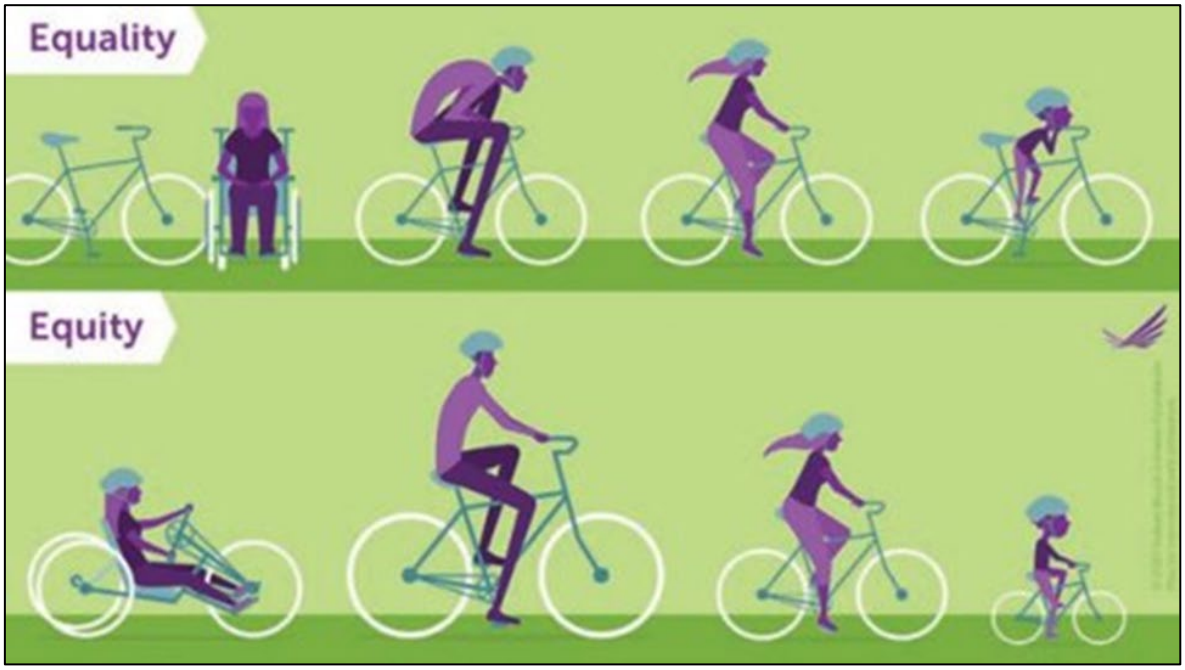
There are other dimensions of social vulnerability to consider, some of which are shown in **Figure 2.46**. Households with single parents who work are more likely to have children at home alone, in daycare or with caretakers outside the home, which can provide challenges in keeping families together in a shelter. Similarly, grandparents raising minors can provide a household that is fully age vulnerable. Immigrants may not have familiarity with local disasters; for example, Central American immigrants may lack experience with cold weather and may need more simplified messaging about how to prepare their housing for expected disasters. Participants who attended a March 7, 2019, Community Coffee for new Americans, foreign born and immigrant populations, expressed concern about winter weather and cyberattacks (NDDES, 2019). Immigrants who are language isolated, non-white, elderly, disabled and/or LGBTQ2S+ may provide multiple dimensions of vulnerability (American Community Survey, 2023). Except for Asian residents, non-white residents generally have lower incomes than white North Dakotans due to historical or current practices that limit access to education, work, or housing.

Figure 2.46: Other Dimensions of Vulnerability, 2021

Percent of Single-Mother Households	7.6%
Grandparents Raising Minors	0.7%
Born in Another Country	4.4%
Median Income for White Residents	$68,951
Median Income for Black Residents	$45,023
Median Income for American Indian Residents	$42,875
Median Income for Asian Residents	$70,370
Median Income for Hispanic/Latino	$51,546

Source: American Community Survey, 2023

Figure 2.47: Equality vs. Equity



Source: Robert Wood Johnson Foundation, 2017

Having pets in the home can limit evacuation options to shelters and accommodations that allow pets or discourage households from evacuating when they cannot take their animal companions with them. In

North Dakota, 63.7 percent of households own pets (World Population Review, 2023). For 44.3 percent of households that means a dog, and 24.8 percent of households include a cat (World Population Review, 2023). Many of these households are multi-animal homes, with 1.5 dogs and 2.8 cats serving as the average number of animals per household where they reside (World Population Review, 2023). This is the largest number of cats per household in the nation (World Population Review, 2023).

Health disparities are defined by the CDC as "preventable differences in the burden of disease, injury, violence or opportunities to achieve optimal health that are experienced by populations that have been disadvantaged by their social or economic status, geographic location, and environment" (CDC, 2022). In the United States, minorities and members of some ethnic groups have higher rates of disease and poor health. Diabetes, asthma, heart disease, cancer and infant mortality are just some conditions that adversely affect these groups more than white Americans. This evolves from a lack of access to health care, nutritious food, and recreational opportunities, and a higher burden of pollution and poverty among other factors. This disparity exists even when controlled for age and income (CDC, 2022). Conditions such as diabetes and asthma can make any resident more vulnerable to the impacts or hazards. When combined with social vulnerability, addressing these impacts can be challenging.

Figure 2.48 shows some common pre-existing conditions and prevalence rates for selected health conditions in North Dakota (Kaiser Family Foundation, 2021).

Figure 2.48: Selected Health Characteristics of North Dakotans

Health Complication, Year	Measure
Life Expectancy at Birth (in years), 2020	76.9 Years
Infant Mortality Rate, 2019	7.5/100,000
Uninsured, 2021	9.0%
Adult Overweight/Obesity Rate, 2017	69.4%
Adults and Adolescents Living with an HIV Diagnosis, 2019	78.6/100,000
Adults Told by a Doctor They Have Diabetes, 2021	11.30%
Heart Disease Death Rate, 2020	147.3/100,000
Adults With High Cholesterol, 2019	22.5%
Adults Told by a Doctor They Have Hypertension, 2021	36.3%
Asthma Prevalence Among Adults, 2017	8.6%
Cancer Death Rate, 2020	139.5/100,000

Source: Kaiser Family Foundation, 2021

For workers whose jobs are outside, hazards can be particularly burdensome due to their exposure to conditions. Smoke from fires, cold, precipitation, and pollution places all outside workers at risk. While masks and bandanas can help a worker protect their lungs from exposure, precipitation may cause slippery conditions and lead to injuries. Heat can be difficult to escape.

Figures 2.49, 2.50, and 2.51 look at the rates of chronic health conditions that can make North Dakotans more vulnerable to health impacts from pollution, heat, and cold, and infectious disease.

Figure 2.49 shows the percentage of people who have been told by a doctor that they have asthma, with the state rate reaching 8.6 percent. Hettinger (15.0), McIntosh (13.4) and Divide (13.2) counties have the highest rates of asthma. All three counties are rural in nature.

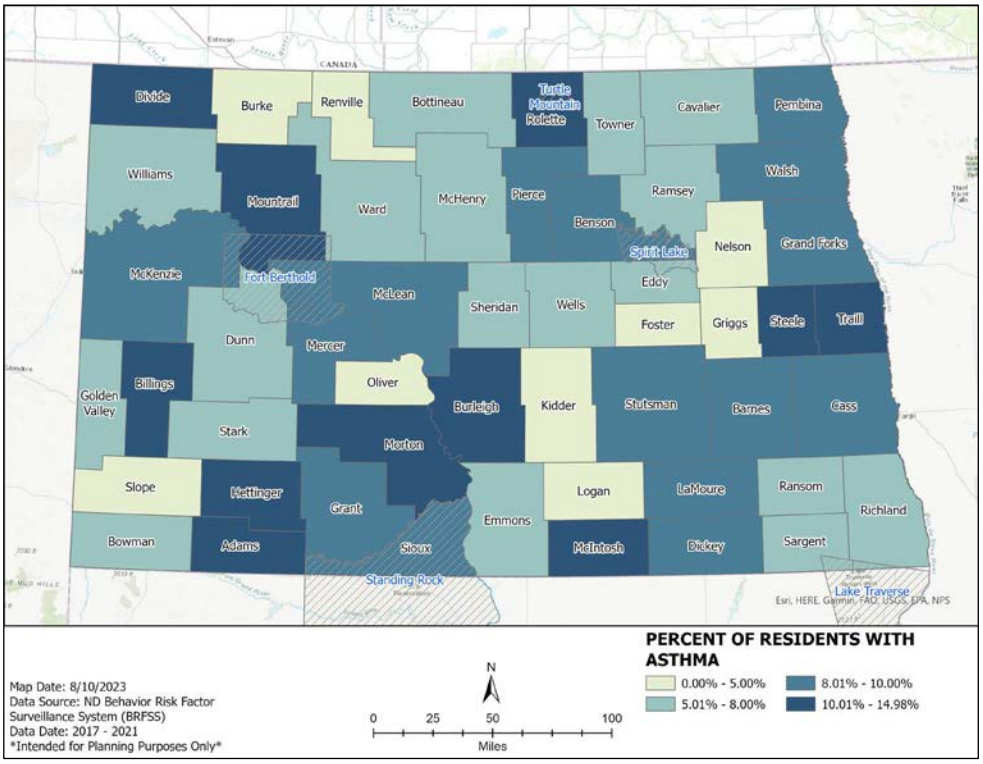
Figure 2.50 shows the county rates for diabetes. Rolette County, home to the Turtle Mountain Reservation, has the highest rate with nearly 1 in 4 residents reporting that they have been told by a doctor that they have diabetes. Jurisdictions with the highest rates of diabetes are those where large number of Native Americans live or are rural western counties: Rolette (24.7), Dunn (20.3), Grant (19.7) and Sheridan (19.3). The rate of North Dakotans who report that a doctor has told them that they have diabetes is 9.4 percent.

Figure 2.51 shows the county rates for residents who have been told that they have cardiovascular disease. The rate of cardiovascular disease for the state is 7.8 percent. Eddy (18.2), Benson (17.7) and Hettinger (16.7), all rural counties, have the highest rates of cardiovascular disease (North Dakota Behavior Risk Factor Surveillance System, 2021).

According to the Drug Enforcement Administration (2021), fentanyl and heroin seizures by the DEA has been on the rise in the state, with a 223 percent increase in the combined drugs between 2019 and 2020. Fentanyl was seized for the first time in North Dakota in 2016 and can be deadly at just a 2-milligram dose (DEA, 2019). Relative to other states, North Dakota's rate of 16 overdose deaths per 1,000 residents in 2020 is low, but it represents a significant increase over the 10 overdose deaths averaged from 2015 to 2019 (CDC, 2021). The most prevalent drugs seized in the state are marijuana and methamphetamine, according to the DEA (2019).

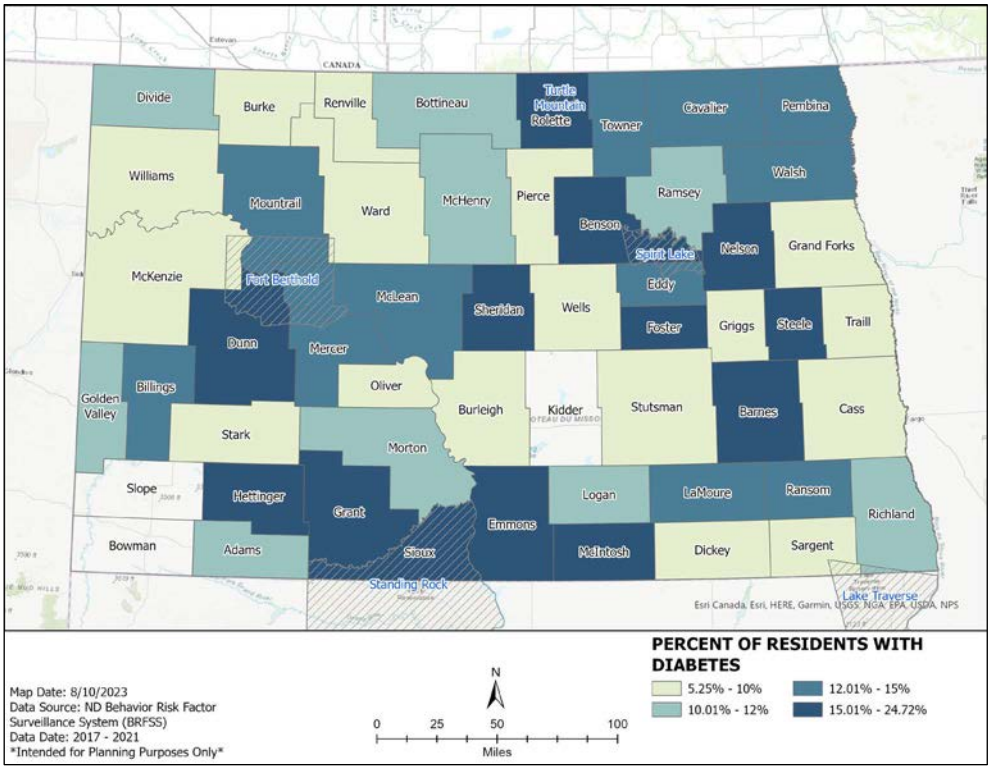
According to the National Alliance on Mental Illness (2021) factsheet on North Dakota, about 108,000 North Dakota residents have a mental health condition, a population that is twice the size of Minot. In February 2021, 28.8 percent of North Dakotans reported depression or anxiety symptoms, and 1 in 5 (NAMI, 2021) of those were unable to access counseling or therapy to cope. An additional 6,000 children reported symptoms of depression. About 28,000 adults (NAMI, 2021) – the population equivalent of Dickinson-- in the state report a serious mental illness.

Figure 2.49: Asthma Rates in North Dakota Counties, 2021



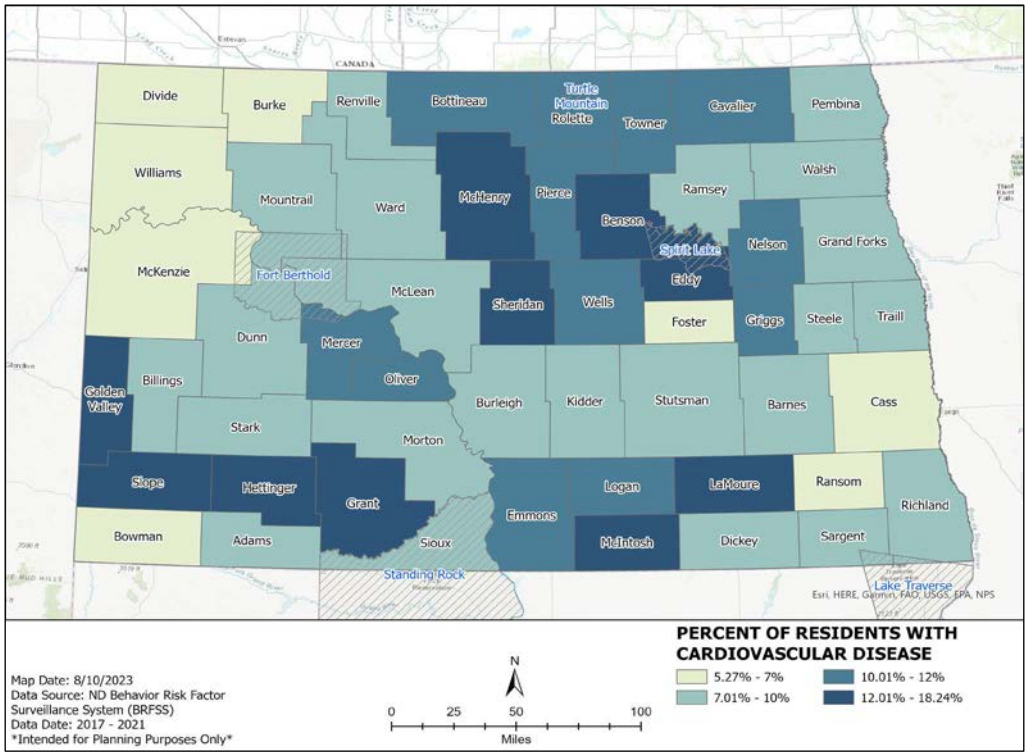
Source: ND Behavior Risk Factor Surveillance System, 2021

Figure 2.50: Diabetes Rates in North Dakota Counties, 2021



Source: ND Behavior Risk Factor Surveillance System, 2021

Figure 2.51: Cardiovascular Disease Rates in North Dakota Counties, 2021

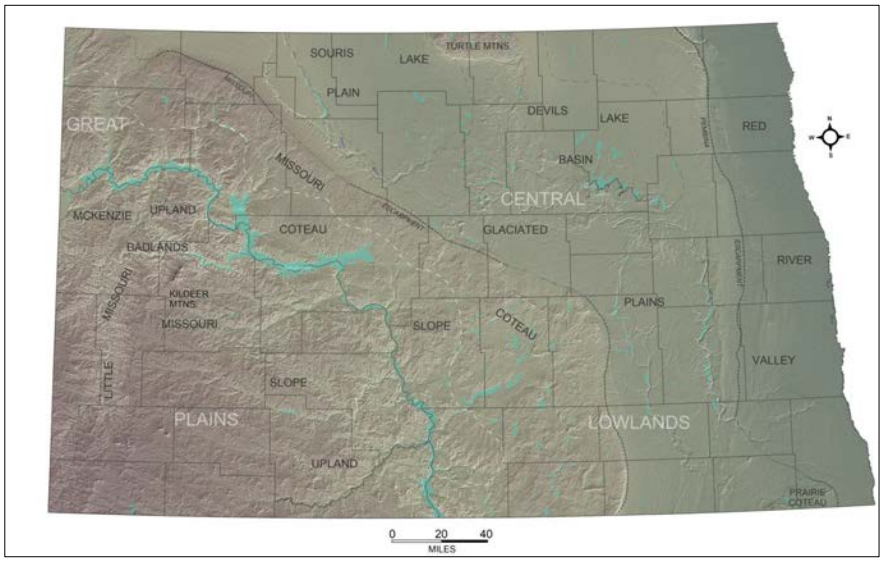


Source: ND Behavior Risk Factor Surveillance System, 2021

2.2.2.3 Geography

North Dakota is roughly a rectangle, bordered on the north by the Canadian Provinces of Manitoba and Saskatchewan, north of the 49th parallel, to the south by South Dakota, to the west by Montana at the historic "27th Meridian west of Washington D.C." (near 104.045 west longitude), and to the east by Minnesota, on east bank of the Red River of the North (State Historical Society of North Dakota, 2021). It is 70,698 square miles, with 1,698 square miles of that as water (Census, 2020). The geographic center of North Dakota is in Sheridan County, near McClusky, while the geographic center of North America is in Pierce County, near Rugby.

Figure 2.52: Geological Regions of North Dakota



Source: NDDES, 2023

North Dakota is located along the north-central border of the United States, in the Northern Great Plains. There are three primary geologic regions in the state – the Red River Valley, the Drift Prairie, and the Missouri Plateau as shown in **Figure 2.52**. They can be most clearly delineated with a topographic map; even on an aerial map the two escarpments that divide the regions are evident. From the east, the Red River Valley extends to the Pembina Escarpment that runs north-south approximately from Walhalla to Hankinson. East of this line was a portion of glacial Lake Agassiz, an ancient water body that was once the largest freshwater lake in North America, and which left behind a deep layer of lake detritus in the form of sedimentary and clay soils.

West of this escarpment begins the Drift Prairie, a region which includes the James River Valley, the Devils Lake Basin, and the former lakebed of glacial Lake Souris. Glacial Lake Souris once covered much of McHenry, Bottineau, and Pierce counties, and left behind the flat plain of the current Souris River basin, similar to portions of the Red River basin (SHSND, 2021). The drift prairie was otherwise shaped by Ice Age glaciers that flattened the pre-glacial landscape leaving behind prairie potholes, small lakes, ice-thrust hills, and erratics (isolated boulders deposited by glaciers). The exceptions to this are the Turtle Mountains at the northcentral edge of the state and the Missouri Plateau of the southwest, two higher terrain areas which had limited glacial activity. The Missouri Escarpment divides the Drift Prairie from the higher terrain of the Missouri Coteau and the Missouri Plateau and runs roughly northwest to southeast from Crosby to Ellendale (Bluemle & Beck, 2007). The Missouri Coteau contains a mix of hill country, rolling prairie, short run streams, pothole lakes, and glacial erratics in a raised landscape marked by glacial deposits and glacial terminal moraine from the last of the great ice sheets.

The higher and more rugged terrain of the Missouri Plateau lies primarily west of the Missouri River and includes the Badlands area. Most of the Missouri Plateau, with the exception of the Badlands, experienced some early glacial action but was shaped mainly by erosion, such as wind and rushing water, escaping the more protracted glacial activity that shaped the state north and east of the Missouri River (Bluemle, 2007). According to Bluemle (2004), the North Dakota Badlands were not carved by glaciers but they are the of result of glacial activity. For the glacier which once blocked the natural northward flow of the Little Missouri River caused the river to divert and began “a vigorous cycle of erosion and downcutting” and initiated badlands development.

Under the Commerce Clause of the United States, there are six navigable waterways in North Dakota, from east to west: the Red River of the North, Bois De Sioux River, James River, Missouri River, Upper Des Lacs Lake, and the Yellowstone River. Federal courts have added Devils Lake, Painted Woods Lake, and Sweetwater Lake. The state engineer has added the Sheyenne River, Pembina River, Mouse (Souris) River, Lake Metigoshe, Cannonball River, Heart River, Knife River, and Long Lake (North Dakota Department of Water Resources, 2015).

Large scale state slope is from the southwest (highest elevations), toward the northeast (lowest elevations). However, there is a Continental Divide running from northwest to southeast across the state which separates the Gulf of Mexico drainage, including the Missouri River basin and James River sub-basin drainages, from the Hudson Bay Drainage, which includes the Mouse/Souris River and Red River/Devils Lake drainage basins (North Dakota Department of Water Resources, 2023). Areas with the greatest degree of slope include the Pembina Gorge in the northeast, the Turtle Mountains in north-central, the Killdeer Mountains in west-central, and the Badlands of far west.

The topography is dominated by the overall higher elevations of the Missouri Coteau, Coteau Slope, and Missouri Plateau regions of the southwest. Elevations range from the highest point in the state, at White Butte, elevation of 3,506 feet, located approximately 7 miles SSE of Amidon in Slope County, to the low point at the James River Valley floor at 1,291 feet, along the James River at the South Dakota border, approximately 6 miles from Ludden in Dickey County (Google Earth, 2023).

2.2.2.4 Ecology

North Dakota is primarily cropland and grassland as shown in **Figure 2.53**, comprising 77 percent of the state's land. There are three types of grasslands – tallgrass, mixed-grass, and short-grass. Tallgrass was once the dominant prairie in the area until sustained modern agriculture, and currently about 3 percent of unplowed tallgrass prairie remains in the Red River Valley (North Dakota Game and Fish, 2023). Mixed grass is the most dominant prairie east of the Missouri River. Shortgrass prairies are in the western part of the state where precipitation is less abundant. Many of the wetlands in North Dakota are in the form of prairie potholes. Forest is mostly found in river valleys and the Turtle Mountains and Pembina Hills in the northern part of the state.

There are 13 endangered, threatened, candidate or recently delisted species in North Dakota. These species are shown in **Figure 2.54**. The least tern and the gray wolf have been delisted since the last plan was published in 2018. The monarch butterfly was a candidate for the Endangered Species List at the time of writing but is no longer on the list (North Dakota Fish and Game, 2023).

Figure 2.53: Land Classification by Percentage of State

Type	Percent of State
Cropland	47%
Grassland/Prairie	30%
Emergent Wetlands	5%
Forest	4%
Open Water	4%
Conservation Reserve Program	4%
Developed, Open Space	4%
Developed, Urban	1%
Shrubland	1%
Barren Land	0.20%

Source: North Dakota Game and Fish, 2023

North Dakota has 906,758 acres of state or federal ecological areas, as shown in **Figure 2.55**, according to data accessed from the North Dakota GIS Hub in November 2023. These areas include one National Park (72,149 acres), four National Historic Sites (72,149 acres) and 523 National Wildlife Refuges (291,985 acres). State resources include 13 state parks, two state natural areas, two state nature preserves, and five state recreation areas (18,055 acres), 27 State Forests (14,107 acres), 374 State Wildlife Management Areas (220,848 acres), and 2,360 Waterfowl Production Areas (289,611 acres) Together, these areas make up 2 percent of the total state land area.

According to the North Dakota Parks and Recreation Department (2020), the recreational areas in the state had significant usage due to the COVID-19 emergency because there was increased recreation participation, recording a record number of campers in 2020, a 35 percent increase over the previous season.

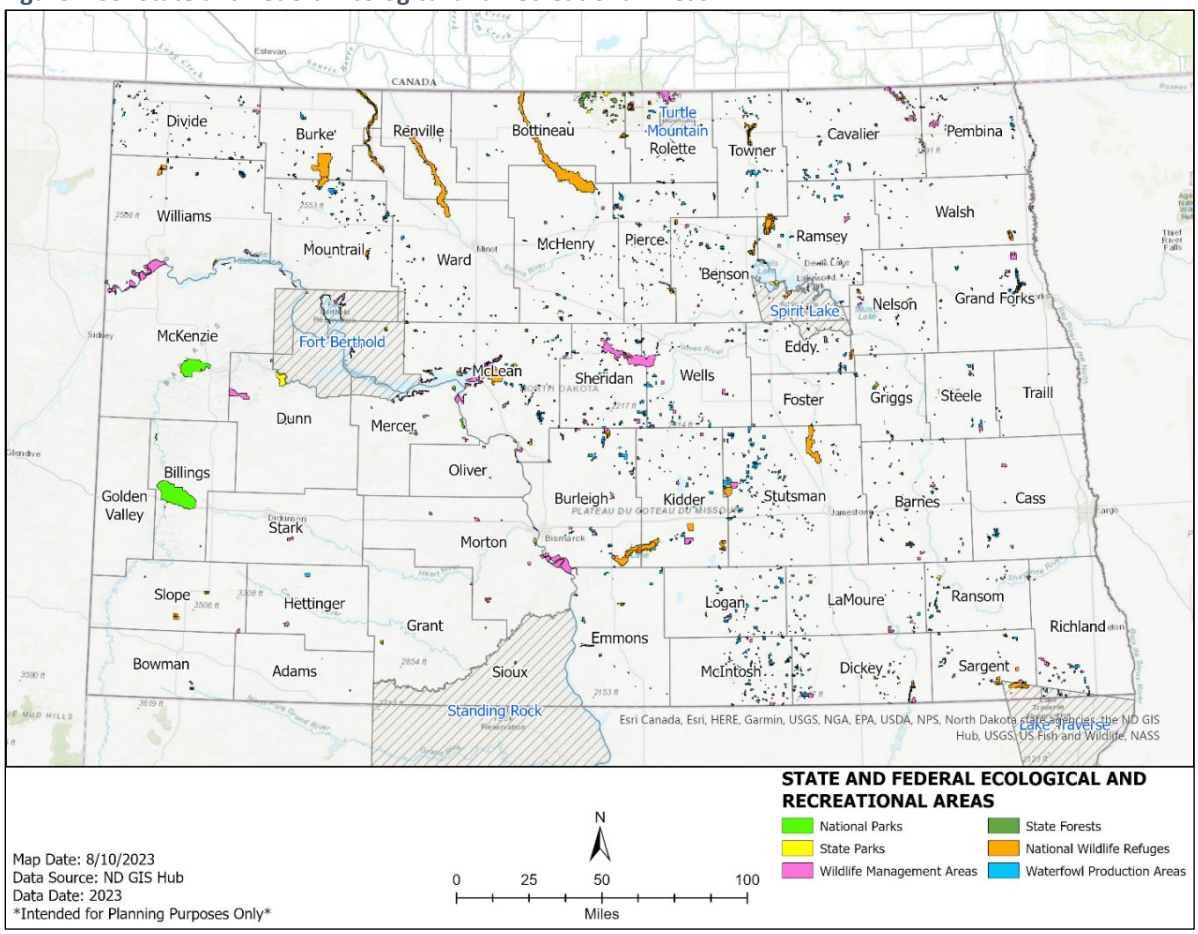
Figure 2.54: Endangered and At-Risk Species

Common Name	Scientific Name	Status
Black-footed Ferret	Mustela nigripes	Endangered
Pallid Sturgeon	Scaphirhynchus albus	Endangered

Poweschiek Skipperling	Oarisma poweshiek	Endangered
Rusty Patched Bumble Bee	Bombus affinis	Endangered
Whooping Crane	Grus americana	Endangered
Dakota Skipper	Hesperia dacotae	Threatened
Northern Long-Eared Bat	Myotis septentrionalis	Threatened
Piping Plover	Charadrius melodus	Threatened
Red Knot	Calidris canutus rufa	Threatened
Western Prairie Fringed Orchid	Platanthera praeclara	Threatened
Monarch Butterfly	Danaus plexippus	Candidate
Gray Wolf	Canis lups	Delisted 11/2020
Least Tern	Sterna antillarum	Delisted 1/2021

Source: North Dakota Game and Fish Department, 2023

Figure 2.55: State and Federal Ecological and Recreational Areas



Source: ND GIS Hub, 2023

2.2.2.5 Climate

General Climate Type - Continental. North Dakota has an extreme continental climate characterized by a very high annual variation in temperature (warm summers and cold winters) and a high daily range in temperatures, as compared to maritime climates (NCEI-Climate of North Dakota, 2007). This high annual range in temperatures is mainly due to the state's location: in the mid-north latitudes (between 45.935° and 49.00° N), along the north border of the continental United States, centered in the North American continent, and farthest from the modifying effect of oceans.

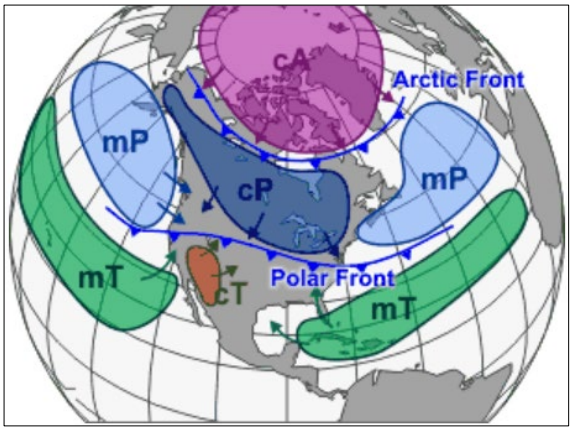
Moisture is a second key component of climate, with North Dakota effectively straddling "the transition from the moist eastern United States and the semiarid West" (Frankson et al., 2022). A high daily range in temperature is primarily due to the lower heat capacity of dry air and dry soils as compared to humid air and either moist soils or large bodies of water (USGS, 2018). Drier air and drier soil will both warm and cool at a faster rate than wetter air or soil.

During a prolonged dry period or drought, summertime high temperatures will often be higher than normal, while the corresponding nighttime lows may be cooler than normal. During a prolonged wet period, the daytime high temperatures may be lower than normal, as more of the available solar energy is used to warm the water molecules in the air and soil, while the nighttime low will tend to be warmer than normal as the increased moisture in the air and soil will retain heat for a longer time. Ironically, the average temperature for either type of day or year can still hover near the climate normal, depending on other conditions than temperature and precipitation alone, such as cloud cover and wind.

The state's longest running record of daily maximum and minimum temperature and daily precipitation reports are for the Bismarck area, dating back to the fall of 1874, and with Fargo area records beginning in 1881 (NOAA/NOWData, 2023). A more complete record of daily temperature and precipitation reports covering most areas of the state dates from 1885 to the present and is used for comparisons throughout this section. Daily snowfall records go back to 1885 in Fargo and to 1886 in Bismarck. Daily reporting of cloud cover or winds is available on a sporadic basis. Hourly wind reports are available for certain airports, beginning in the late 1970s.

Figure 2.56 shows common air mass types in North America. The dominant airmass types which affect all areas of North Dakota are Continental Polar (cP), which originates over the high latitudes of central Canada, and Continental Tropical (cT), which originates over the upland areas of the western United States (NOAA-Air Masses, 2023). A third common airmass type is Maritime Polar (mP), which originates over the Gulf of Alaska and far-north Pacific Ocean (NOAA, 2023). Maritime air from the Pacific loses most of its moisture in transiting across the western mountain ranges.

Figure 2.56: Common Air Mass Types



Source: NOAA, 2023

Two other and more extreme airmass types also affect North Dakota, generally over shorter and highly variable periods of time. Midwinter will often be impacted by the extreme cold of Continental

Arctic (cA) air, originating near the North Pole, while the midsummer will often be impacted by very humid Maritime Tropical (mT) air, originating near the Gulf of Mexico (NOAA, 2023). Arctic air is characterized by very cold and dry air, typically well below zero (F), and is responsible for North Dakota's coldest wintertime temperatures. Continental Tropical air is typically warm (or hot) and dry and results in North Dakota's highest summertime air temperatures. Maritime Tropical air is typically hot and humid, and though the air temperature can be less extreme than with Continental Tropical air, the increased humidity often results in North Dakota's highest Heat Index days (NOAA, 2023; Gust, 2018). Local, near-surface humidity levels may be reported in terms of either Relative Humidity or Dewpoint Temperature readings.

Relative Humidity is the ratio of how much water vapor is in the air compared to how much the air can hold at a given temperature and pressure (AMS-Relative humidity, 2013), and is often referred to as a comfort index. The ideal relative humidity level for humans ranges from 30 to 50 percent, according to a Mayo Clinic (2023) report. Lower levels can result in dry skin, respiratory issues, etc., and higher levels can make it difficult for the human body to cool itself through the evaporation of sweat.

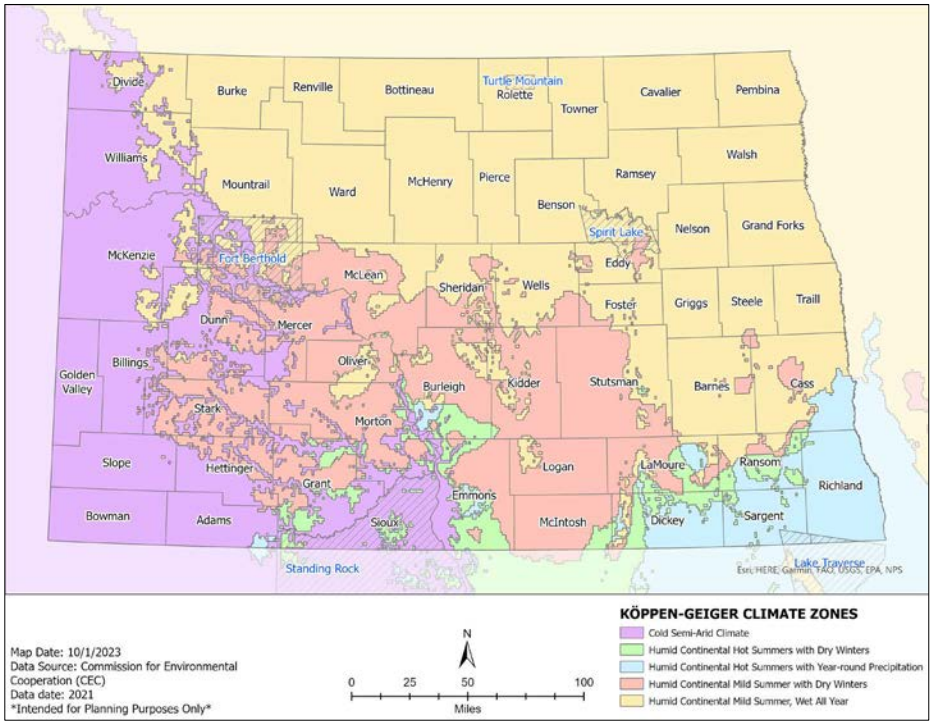
Dewpoint Temperature is a measure of the physical quantity of moisture in the air. When the Dewpoint equals the Air Temperature, the Relative Humidity is maximized at 100 percent, and either dew, frost, or fog forms (AMS-Dewpoint, 2013). The Heat Index can be calculated using Air Temperature and either Dewpoint or Relative Humidity.

The record maximum dewpoint for the state was set at 89 degrees Fahrenheit near Wahpeton on July 19, 2011. With a concurrent air temperature of 91 degrees Fahrenheit, the maximum heat index was 131 degrees Fahrenheit (NWS, 2023). On that same day, the record dewpoints for Minnesota (Moorhead: 88) and for Manitoba (Brandon: 82) were also set (Gust, 2018). That day, dewpoint temperatures reaching more than 80 degrees Fahrenheit extended throughout southwestern and western Minnesota, much of eastern South Dakota, almost all of North Dakota along and east-northeast of the Missouri, and well into southwestern Manitoba past Canada Hwy 1 and the Virden-Brandon line.

Sub-climates. Sub-climate differences across the region are primarily driven by the range of temperature and precipitation extremes experienced in any given year or over a series of years. Average temperatures are generally cooler across northern North Dakota, and generally warmer in southern North Dakota. In contrast, conditions are generally wetter and more humid in the somewhat lower elevations of eastern North Dakota and points further eastward towards the Great Lakes (Frankson, 2022). The somewhat higher elevations of far western North Dakota, and the high plains region stretching westward to the Rocky Mountain Front Range, are drier and less humid.

Figure 2.57 shows that most of North Dakota falls under a Köppen-Geiger climate classification, *Dfb* (continental: cold/snowy winters, fully humid, with warm summers). Extreme western North Dakota resembles more of a Steppe type climate, *BSk* (continental: arid/semi-arid, steppe, cold). In general, the *average climate* across North Dakota can best be described as a statistical position between climate extremes (Cui, et. al, 2021). Increasingly more humid areas extend eastward from ND into MN, and drier areas extend westward into MT. Increasingly colder areas extend northward into central Canada, while increasing warmer conditions extend southward into South Dakota.

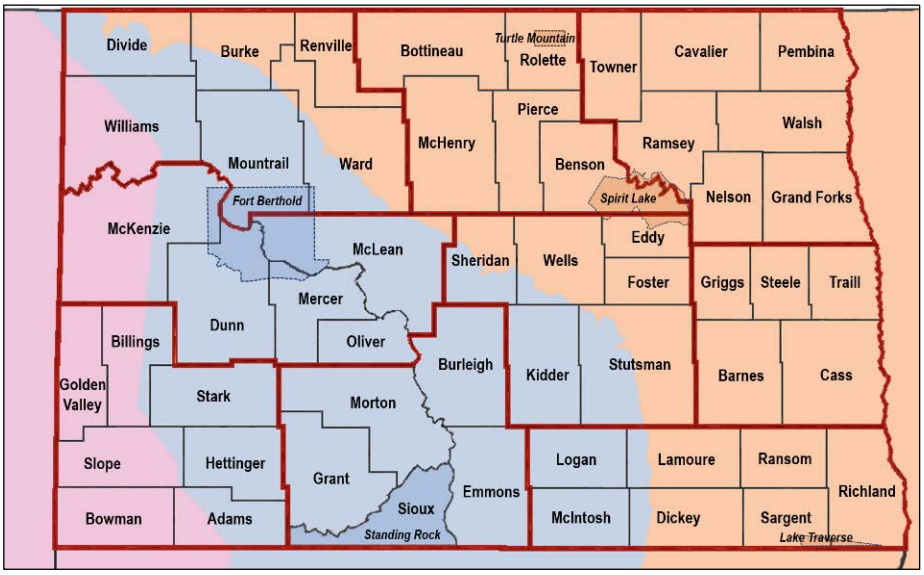
Figure 2.57: Köppen-Geiger Climate Classification



Source: Commission for Environmental Cooperation, 2021

Figure 2.58 employs a hybrid classification method, after Ryberg (2015), which combines the traditional Köppen-Geiger climate classification scheme with Level II Ecological Regions (Commission for Environmental Cooperation, 1997), and which better describes land-use and drainage characteristics pertinent to a variety of North Dakota hazard types.

Figure 2.58: Ryberg Climate Classification



Source: CPC: ND Climate Divisions, 2023

Here, the predominant *Dfb* climate area is split between its *eastern* temperate prairie portion (orange) and *western* semi-arid prairie portion (blue) (NOAA/CPC: ND Divisions, 2023). The far western *BSk* area is then a continuation of the semi-arid prairie (pink) with a somewhat cooler and drier climate characteristic.

Micro-climates. The local climate that individuals and properties experience across the state and in any county, tribal land or community depends on a variety of factors such as soil type, land-use/land-cover, slope, elevation, drainage, and wind/exposure.

Soil Type affects rainfall absorption and retention, infiltration, and runoff rates, among other things. Soil types across north-central and eastern North Dakota generally align with glacial scour and deposition activity or post-glacial lake-bed sediments and wave action (Bluemle, 2005a).

North Dakota's Drift Prairie corresponds to the orange portion of Figure 2.58 and has gently rolling hills and fertile valleys, covered with a thick black layer of mainly sandy, silty, and clayey loams, with a mix of limey subsoils and gravely substrata (Bluemle, 2005a). The markedly flat Red River Valley of far eastern ND lies in ancient glacial Lake Agassiz Plain, much as the Mouse River Valley in north-central North Dakota lies in the ancient glacial Lake Souris Plain. Ancient lake sedimentation or alluvial deposits are noted in the mix of loams, sandy loams, silty loams, clays, and occasional saline (salty) clay loams (Omodt et al., 1961). This soil retains moisture well, helps to maintain a more humid overall growing season, and supports the most highly productive agricultural regions in the state.

The Missouri Coteau into the Coteau Slope, the Turtle Mountains, and the Prairie Coteau mark the southernmost extent of the Laurentide Ice Sheet into the state. These areas of Terminal Moraine are composed of rolling hills with some steeper banks, with the thick brown soil layer common to semi-arid grasslands, containing mainly sandy loams and clay, areas with mixed boulder deposition (Omodt, 1961), and with areas of peat located in the Turtle Mountains (Cobb et al., 1917). Differential soil types, slope, or exposure can influence the successful mix of agriculture and ranching.

The Missouri Plateau area of Southwest North Dakota, along and south of the Missouri River, was left untouched by more recent glacial activity. According to Omodt (1961) most of the Missouri Plateau has buttes and rolling hills in the uplands with steeply cut banks into the river valleys and is covered with a brown soil layer common to semi-arid grasslands, containing mainly sandy loams and clay.

The Badlands of far Southwest North Dakota were also untouched by more recent glacial activity, with highly eroded clay-scoria slopes, buttes, and steep canyons common throughout. According to the North Dakota Game and Fish Department, "This highly dissected landscape was formed by water erosion of the soft silt or clay soil and collapse following lignite coal bed burnings" (NDGF-Badlands, 2023, p.1). Both the Missouri Plateau area and the Badlands are primarily suited to rangeland and ranching, though most operations successfully incorporate both crops and livestock production.

Short-term micro-climates. These can form within a county under a variety of conditions. For example, areas which receive significantly more rainfall or snowfall than other areas, typically through spotty convective rain or snow showers, can develop temporary warm or cool zones. In the winter, areas with recent heavier snowfall may cool more sharply overnight due to increased insulation from any lingering soil heat, or warm less quickly the following day due to increased reflection of solar energy off the fresh snow surface. A township-sized area that is largely snow-free may warm by 10-20 degrees over a similar

sized area covered with fresh snow, with greater temperature differences occurring when wind speeds and airmass mixing are low.

During the summer months, a township-sized area with recently wetted soils will generally remain a bit cooler than surrounding dry areas during the day, due to the solar energy used to evaporate moisture from the soil, and stay a bit warmer during the night, due to the higher retained heat in the near surface moist air and the moist soil (Trenberth et al., 2003). These small-scale temperature differentials often persist during periods of calm or light winds and dissipate quite quickly under high wind conditions.

Every living and many non-living things are affected by wind. Wind can amplify or reduce the extremes of temperature and humidity, its presence or absence being an important consideration for most hazards and their respective impacts, while its extreme range across the state is an especially crucial consideration (Frankson, 2022; Gust, 2022). Changes in speed and/or direction often indicate the passage of airmass boundaries, cold or warm fronts, and related changes in weather. Winds can vary significantly with height above the terrain, often much stronger some tens to hundreds of feet above the terrain where the frictional forces of surface roughness, structures, or forests diminish.

In current weather observation practice, windspeed and direction are measured at most automated and manual weather stations, but not necessarily at climate reporting stations. An instantaneous windspeed is measured at 3-second intervals. Sustained winds reflect the highest windspeed average over any 2-minute period within the 10 minutes preceding the observation time. Wind gusts are the highest 3-second measurement during that same 10-minute period. Peak wind is the maximum 3-second gust measured *at any time* during the hour.

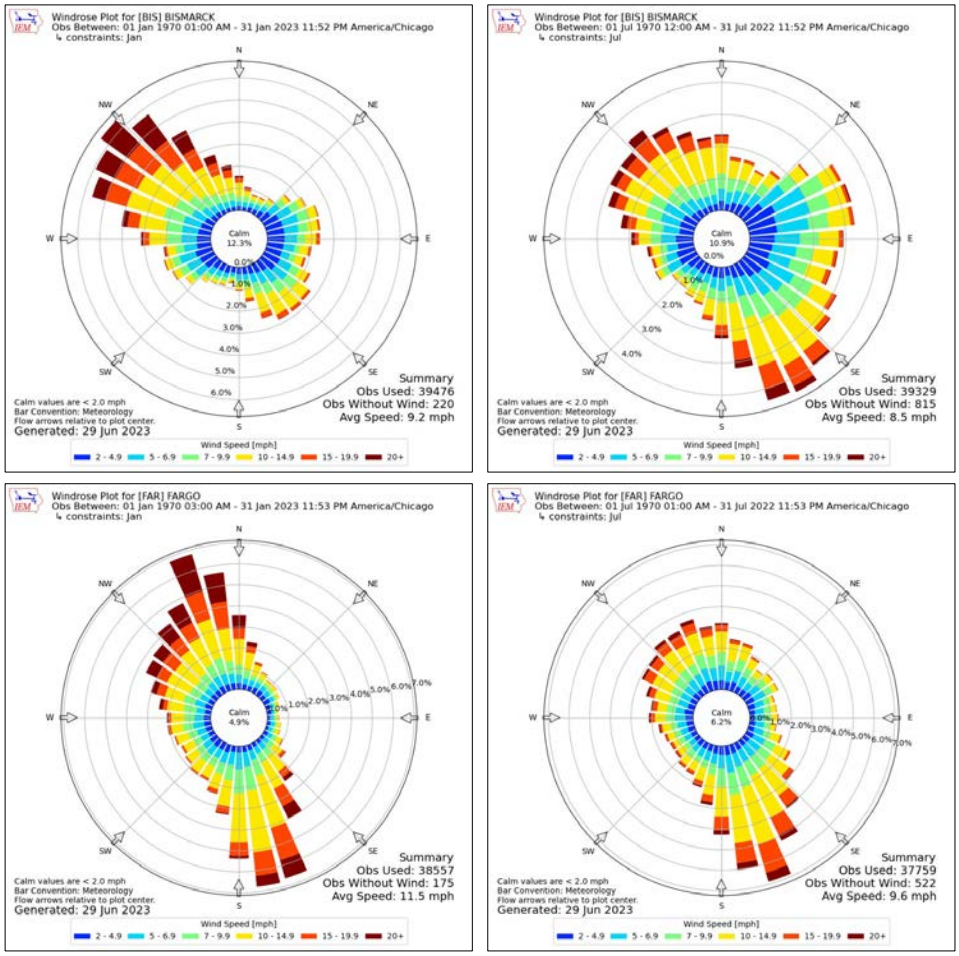
Gradient winds are those sustained winds at various atmospheric levels and produced by larger scale pressure differences in the atmosphere. Daytime warming of the terrain by sunshine gives rise to convective mixing of the lower atmosphere, which can then mix higher gradient windspeeds down to the surface, often in the form of buffeting wind gusts.

The standard height for measuring surface winds for aviation purposes is at 10 meters (32 ft.) Above Ground Level (AGL), with wind speed measurements available at most airports around the state (FCM-H1, 2019; Gust, 2022). Wind measurements for agricultural purposes (example NDAWN: North Dakota Agricultural Weather Network) are often as low as 3 meters (9.8 ft.) and for fire-weather monitoring purposes (example RAWS: Remote Automated Weather Stations) at around 6 meters (20 ft.) AGL.

Multi-source/composite wind energy estimates indicate that derived winds for North Dakota, measured at 10 meters AGL, range in average from about 6 mph in the more sheltered river valleys and forested areas, to around 20 mph across the exposed higher elevation peaks and hilltops of the state (Global Wind Atlas, 2023). When measurements are estimated at near 100 meters AGL the range from river valleys to hilltops closes to from 15 to 20 mph, on average.

Predominant Winds. Wind Roses are plots providing frequencies of wind direction and wind speed. A convenient program online at the Iowa Environment Mesonet (IEM) can readily calculate and plot wind roses that indicate the dominant wind directions of a particular month or season of the year, or for any period of hours or days (IEM-Wind Roses, 2023). Wind roses are commonly used for orienting airport runways but can also be used for a variety of wind related design concerns. **Figure 2.59** shows examples of wind roses for Bismarck and Fargo airports.

Figure 2.59: IEM Wind Roses for Bismarck and Fargo Airports



Source: IEM, 2023

- Airport Winds. Long-term hourly wind records date back to around 1970 for the larger airports in the state, with hourly wind records available for roughly 45 airports statewide with the IEM online resource (IEM, 2023). While not every county or community in the state has such data readily available, nearby airports with similar terrain are generally sufficient for determining locally representative wind plots. The composite annual wind roses for Bismarck, for the months of January and July from 1970 through 2022 show predominate west-northwesterly winds in January (top left) and the dominant south-southeasterly winds in July (top right). In Fargo, the predominant wind direction in January (bottom left) is evenly split between a north-northwesterly and a south-southeasterly direction, while the predominant wind direction in July (bottom right) is from the south-southeast, with somewhat increased frequencies of winds blowing from an easterly direction.

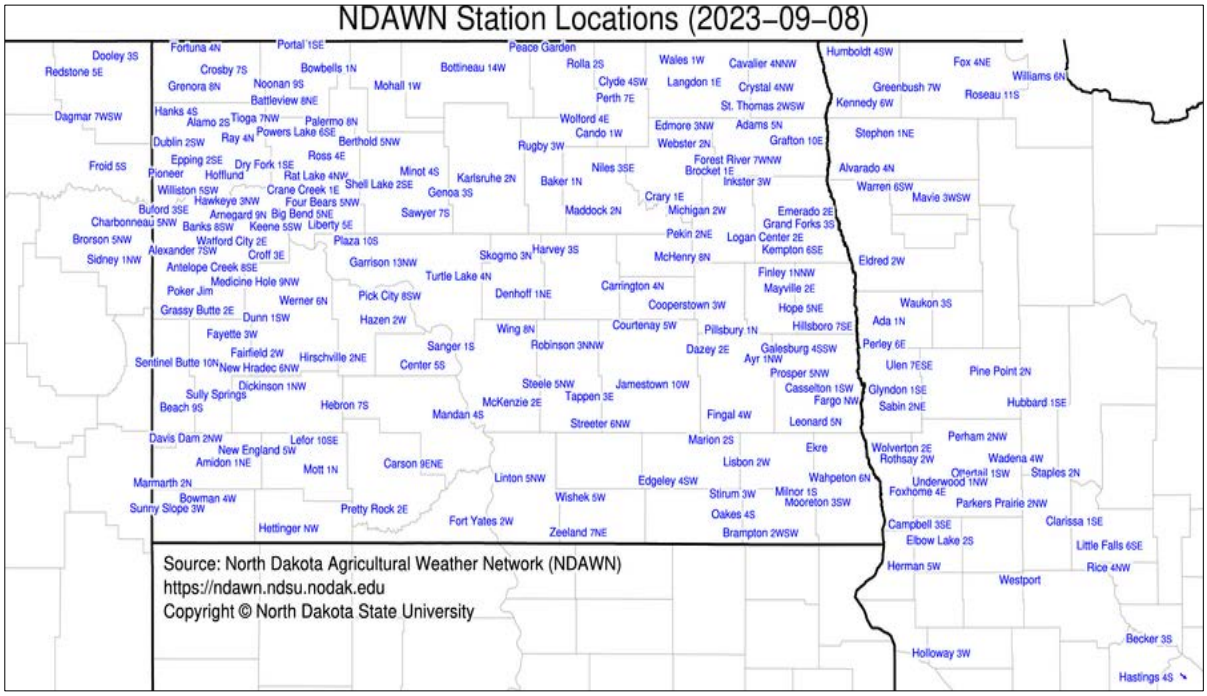
- Agricultural Winds. Hourly wind records for North Dakota Agricultural Weather Network (NDAWN) stations, extend back as early as March of 1990 for stations located near Grand Forks and Fargo. Wind sensors for agricultural purposes are commonly set at 3-meter (9.8 ft.) heights, to better record conditions near a crop canopy. However, NDAWN has been steadily adding more 10-meter towers to

their stations to provide for a more complete array of weather information coverage. Sustained winds at most locations frequently reach from 30-40 mph, in both warm and cold seasons. Peak winds and wind gusts frequently reach more than 60 mph during both summertime convective storms and winter storms or blizzards (NDAWN, 2023). The highest wind gust reading on any North Dakota-based NDAWN station at 3 meters, was 94.3 mph, recorded at 4 miles SSW of Galesburg, in Cass County, on July 4, 2017. This was during a summer severe thunderstorm downburst event.

To provide for a more complete array of weather information coverage, NDAWN has been steadily adding more 10-meter towers to their stations. The highest wind gust reading on any North Dakota-based NDAWN at 10 meters was 85.2 mph, recorded at Fortuna 4N (Divide County) at 1:02 a.m. CST on Jan. 14, 2021. The corresponding 3-meter wind gust reading was 75.9 mph, recorded at 1:19 a.m. CST on the same day. This was during a winter high wind and/or blizzard episode (NDAWN, 2023). These 10-meter wind sensors are fairly recent additions to the NDAWN sensor suite and are not yet available at all NDAWN locations, shown in Figure 2.60.

- Remote Winds. The **State Record highest non-tornadic windspeed of 135 mph** (measured at standard heights) occurred on the evening of Sept. 15, 1997, and was measured around 8 p.m. MDT by the Sand Creek RAWS (Remote Automated Weather Station) site, about 7 miles northwest of Amidon (Slope County), in far southwestern North Dakota (Gust, 2022). Statistics for the highest non-tornadic wind gust, largest hail size, and strongest tornado reports in each county can be found in the ND County Statistics document, available online at the NWS Bismarck (2023) webpage and at NCEI StormData.

Figure 2.60: NDAWN Network



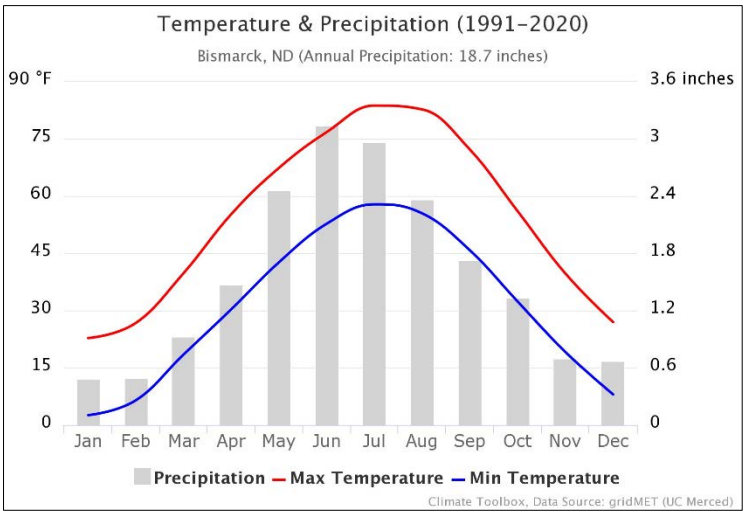
Source: NDAWN, 2023

Climate/Cooperative Observations. The NOAA/NWS Cooperative Observation station for Bismarck has the longest combination record set in the state, with records from previous downtown locations and the current airport location stretching back to 1874.

Figure 2.61 depicts the monthly temperature and precipitation pattern for the Bismarck area, all based on the latest 30-year Climate Normal period, 1991-2020 (UCM, 2021). The red and blue lines mark the daily average maximum and minimum temperatures, respectively. The grey bars mark the average monthly precipitation, with an average annual rainfall total for Bismarck of 18.7 inches.

From this type of graphic, one notices that the warmest months, on average, are July and August, while the wettest month, on average, is June.

Figure 2.61: Temperature and Precipitation in Bismarck

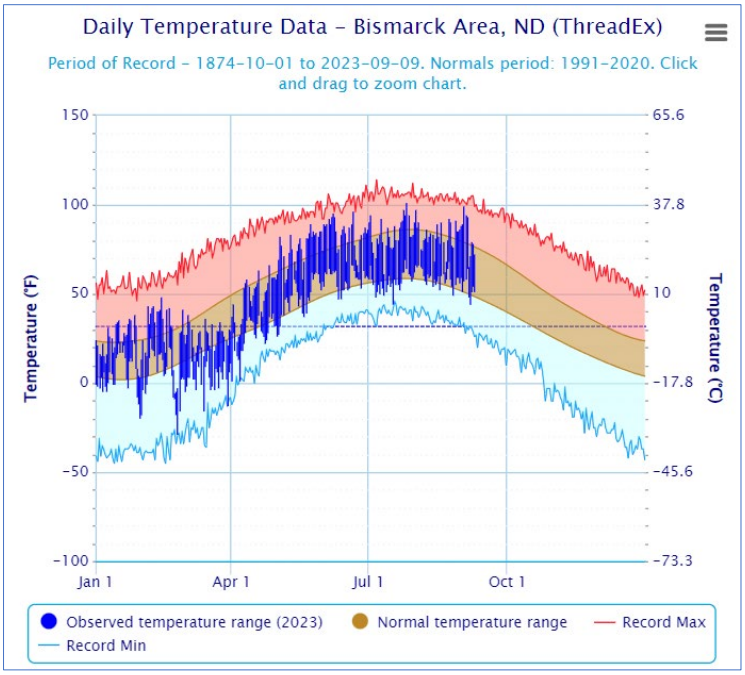


Source: University of California-Merced, 2021

Figure 2.62 depicts a much more robust concept of temperatures in Bismarck, which includes the normal range in temperatures in the golden bar, with the extremes of daily record maximums and minimums in red and light blue, respectively.

The dark blue line shows a daily temperature trace from January 1 - September 9, 2023 (NOAA-NOWData, 2023). Notice the extreme variability that occurs on a day-to-day, week-to-week and even month-to-month basis. Even a few daily records were broken, including 3 new daily record low temperatures set on 24 Feb (-29F), 29 Mar (-13F) and 6 Apr (1F), 2023.

Figure 2.62: Daily Temperature in Bismarck



Source: NOAA, 2023

Extreme Continentality leads to Extreme Climate Variability.

Located at the geographical center of the North American Continent and furthest from the modifying effects of oceans or seas, North

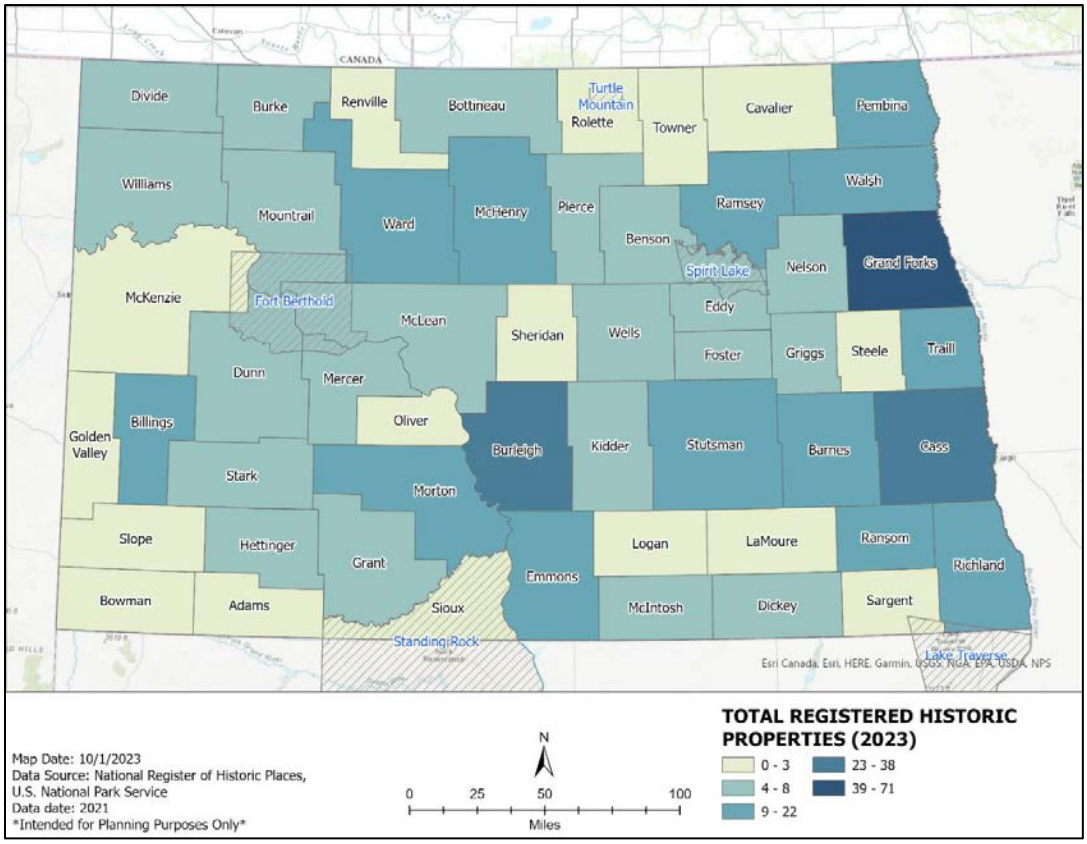
Dakota epitomizes the concept of extreme continentality. It has one of the highest degrees of day-to-day, week-to-week, month-to-month, year-to-year, and multi-decadal variability in both temperature and precipitation of anywhere on the continent (Cui, 2021). North Dakota's range of extremes in heat and cold are only exceeded by two other states, those being the intermountain states of Montana and Utah (NCEI-State Climate Extremes Committee, 2023). These two states have markedly larger variations in elevation which likely led to the markedly colder minimum temperatures recorded at locations several thousand feet higher in elevation than that of the record cold North Dakota location.

Unlike the intermountain west, however, most of North Dakota is prone to such extremes. Given the relatively flat, low-relief nature of the terrain in North Dakota, most areas in the state have a similar high degree of variability in temperature and precipitation, with only a slight difference in average value from one climate division and/or county to the next.

2.2.2.6 Buildings

There are 465 historic districts, buildings, structures, and objects identified in the National Register of Historic Places, which are identified by county in **Figure 2.63** and viewed by type in Appendix D.1.5. They include old schoolhouses and post offices, historic bridges, churches, cemeteries, and other locations.

Figure 2.63: Historic Areas in North Dakota by County



Source: U.S. National Park Service, 2021

In addition to historic buildings, there are buildings throughout the state that are at risk of damage from hazards. Subsequent hazard profile sections in this plan cover building exposure through the use of FEMA's National Risk Index mapping tool.

2.2.2.6.1 Property Protection

Flood insurance is available to residents in communities that participate in the National Flood Insurance Program (NFIP). The program requires communities to adopt and enforce a floodplain management ordinance in exchange for federally backed flood insurance availability. This ordinance should limit new development and additions in identified special flood hazard areas. There were 337 communities in North Dakota participating in the NFIP as of October 2023. Communities that have been sanctioned by the NFIP as of December 2022 are shown in **Figure 2.64** (NFIP Community Status Book, 2022). A sanctioned community is one that has chosen not to participate in the NFIP or has withdrawn or been suspended from the program. It is important to note that not all communities are sanctioned; some have elected not to participate in the NFIP. North Dakota has also taken this opportunity to obtain Hazard Mitigation Grant Program funding to acquire flood prone properties in the last five years.

Figure 2.64: NFIP Sanctioned Communities

Community	County	Sanction Date (S: Suspended, W: Withdrawn)
Adams, City of	Walsh	07/25/1976
Anamoose, City of	McHenry	07/17/1989(S)
Barnes, Township of	Cass	01/20/2015(S)
Brinsmade, City of	Benson	12/20/2001
Fordville, City of	Walsh	06/04/1977
Gardar, Township of	Pembina	05/03/2012
Gladstone, City of	Stark	08/13/1977
Golden Valley, City of	Mercer	06/27/1976
Hegton, Township of	Grand Forks	12/17/2011
Hoople, City of	Walsh	08/13/1977
Kenmare, City of	Ward	02/23/1983
Lansford, Township of	Bottineau	09/03/2009(S)
Logan Center, Township of	Grand Forks	12/17/2011
Loretta, Township of	Grand Forks	12/17/2011
McKenzie County	McKenzie	09/02/2016
Neche, Township of	Pembina	06/06/2010
New England, City of	Hettinger	07/16/1977
Oberon, City of	Benson	06/20/2002
Park, Township of	Pembina	04/27/1983
Portal, City of	Burke	09/06/1989(S)
St. Thomas, City of	Pembina	02/21/1976
St. Thomas, Township of	Pembina	05/03/2012
Stafford, Township of	Renville	12/02/1987(W)
Stanton, City of	Mercer	04/02/1977
Towner, City of	McHenry	01/31/1976

Source: NFIP Community Status Book, 2022

2.2.2.6.2 Housing Units

The North Dakota State University Center for Social Research and the Department of Agribusiness and Applied Economics evaluate the housing needs for the state periodically and issued its most recent report in 2022. The report identifies the demographic trends of working-age oil workers creating a population boom in western North Dakota as the Bakken oil boom hit in the early 2010s. Stabilization of that workforce has caused some out-migration of this population in more recent years. This workforce included a more racially and ethnically diverse population (Hodur et al., 2022). **Figure 2.65** shows the counties with the biggest housing increases and decreases in the state since the last plan was published in 2018. McKenzie County increased housing the most (26.3 percent) and was a standout even among gainers. Urban areas and Burke County also added significant housing (American Community Survey, 2023). Central North Dakota rural areas were the locations most likely to experience housing reductions since the last plan.

Figure 2.65: Biggest Housing Shifts, 2018-2021

Most New Housing	
McKenzie	26.3%
Williams	7.2%
Stark	5.9%
Cass	5.4%
Burke	3.4%
Grand Forks	2.2%
Most Housing Reductions	
Rolette	-16.0%
Benson	-13.9%
Dunn	-12.6%
Divide	-12.3%
Pierce	-11.3%
Logan	-11.1%
Bottineau	-10.1%
Dickey	-10.0%

Source: ACS, 2023

Another change in housing since the past plan has been a substantial reduction in workforce housing, commonly known as Man Camps. These temporary features sprung up in areas where oil jobs were outpacing new development in the northwest region. As the workforce has stabilized and development has caught up, the need for these properties has decreased to the point that those remaining are the more upscale and safe properties.

Homeownership in North Dakota has decreased in recent years, even when considering income. Hodur, et al. (2022) noted that income between 2010 and 2020 increased 41 percent in the state while housing value increased 80 percent, and that this is likely a driver of this phenomenon. Additionally, the areas with growing populations have newer housing stock, while older, more affordable housing is prevalent in rural areas where populations are decreasing. Increased construction costs for the newer homes are a contributor to the higher costs of newer homes, which make them prohibitive to first-time homebuyers. Correspondingly, rents have gone up as well (Hodur, et al, 2022). This means that the cost of housing is highest where it is most in need, and lowest where there is a lack of demand.

To keep up with housing needs, North Dakota would need to add nearly 10,000 new housing units between 2020 and 2025, with the most significant needs for housing being affordable housing in the northwest, Fargo, and Bismarck areas, and housing needs decreasing near Devils Lake (Hodur, et al., 2022).

Figures 2.66 and 2.67 look at counties with many mobile homes or homes built prior to 1939. Not all houses are built to the same standards of safety. Newer homes are more likely to abide by more recent codes and standards. Homes built on a foundation also will be more likely to withstand winds and flooding over mobile homes, campers, and other temporary housing. Multi-family structures have the potential to displace multiple renters during a hazard. Homes built before 1980 are more likely to contain lead and expose residents to lead poisoning. Building materials used for older homes have had more time to deteriorate and were often built before there were codes to guide decisions about construction.

Awareness of housing fragility characteristics can help communities better prepare for short- and long-term sheltering and displacement needs. Rolette, Kidder, Mountrail, and Slope counties all exceed 16.0 percent of housing units as mobile homes or manufactured housing, which pose risks for summer and winter severe weather, more easily burn in a fire and permit noxious fumes from hazardous material releases (American Community Survey, 2023). Golden Valley, Griggs, and Ransom counties all have more than a third of their homes built in 1939 or earlier, and older homes are considered more vulnerable to dangers from fire, tornado and damaging wind.

Figure 2.66: Counties with 10.0 percent or More Mobile Homes

County	Mobile Homes	Percent Mobile Homes
Rolette	672	18.2%
Kidder	172	16.5%
Mountrail	568	16.4%
Slope	52	16.3%
Benson	304	16.0%
Renville	135	15.8%
Billings	47	15.4%
Dunn	208	14.1%
McKenzie	692	14.0%
McHenry	277	11.9%
Mercer	407	11.6%
Oliver	72	10.5%

Source: American Community Survey, 2023

Figure 2.67: Counties with 25.0 percent or More Houses Built 1939 or Earlier

County	Occupied Units	Built 1939 or Earlier	Percent 1939 or Earlier
Golden Valley	719	278	38.7%
Griggs	927	338	36.5%
Ransom	2,305	775	33.6%
Traill	3,276	1025	31.3%
Nelson	1,318	412	31.3%
Burke	903	282	31.2%
Divide	911	274	30.1%
Grant	1,056	308	29.2%
Hettinger	1,037	288	27.8%
Barnes	4,833	1,297	26.8%
Slope	319	84	26.3%
Sheridan	624	162	26.0%
Steele	776	200	25.8%
Emmons	1,507	388	25.7%
LaMoure	1,728	438	25.3%
Towner	980	245	25.0%

Source: American Community Survey, 2023

Figure 2.68 looks at some of the housing fragility characteristics, noting that communities like Dunn and Burleigh counties have more mobile homes; Golden Valley County has nearly half of its housing stocks built before World War II; and Cass County has a high number of multi-unit structures (American Community Survey, 2023).

Figure 2.68: Housing Fragility, 2021

Mobile Homes	26,294
Highest Mobile Home Total	Burleigh (3,657)
Highest Proportion of Mobile Homes	Dunn (27.6%)
Buildings with More than 2 Units	102,607
Highest Proportion of Multi-Unit Buildings	Cass (42.9%)
Built Pre-1980	186,695
Built Pre-1940	44,952
Highest Proportion Built Pre-1940	Golden Valley (42.4%)

Source: American Community Survey, 2023

Institutionalized housing can provide a variety of logistical challenges. Populations in correctional facilities and nursing facilities can be a challenge to evacuate for very different reasons. Students and military housing residents may lack experience with local conditions and evacuation routes and have higher sheltering needs if they have limited local contacts. There were 26,250 North Dakota residents in group quarters as of 2020 (U.S. Census 2020), with statistical breakdowns tracking largely with population. A breakdown of the type of institutionalized population by county is shown in the appendix.

Obviously, in the face of hazards, the ultimate position of vulnerability is to be unhoused. **Figure 2.69** shows the most recent Point-In-Time Counts of homeless persons in North Dakota. These counts are conducted annually in January overnight, during a time of year when most people who can, will go to shelters. The counts are conducted throughout the state on the same night and represent the best available census of the homeless, and they show a recent uptick in the homeless population during the past two years (North Dakota Continuum of Care, 2023).

Figure 2.69: Point-In-Time Counts of Homeless Persons

Year	Total Households		Total Persons	
	Sheltered	Unsheltered	Sheltered	Unsheltered
2023	465	165	608	176
2022	405	77	527	83
2021	344	70	474	74
2020	391	31	507	34
2019	408	6	545	12
2018	444	48	494	48

Source: North Dakota Continuum of Care, 2023

Homelessness affects ethnic and racial minorities and children more than other North Dakotans. Hispanic residents are three times more likely to experience homelessness while black residents are six times more likely; Native Americans are seven times more likely than white North Dakotans to experience homelessness. More than 1,700 children reported unstable housing during the 2020-21 school year (Hodur, et al., 2022). The North Dakota Housing Discrimination Act was enacted in 1999 and bolsters the federal Fair Housing Act (FHA) initially adopted in 1968 but revised most recently in 1991 to protect the disabled. The FHA also protects fair housing practices based on sex, race, color, and national origin. The state law adds protections relating to age, marriage, public assistance, and domestic violence victims.

2.2.2.7 Economy

North Dakota has a growing gross domestic product (GDP) to match its growing income. Since the last plan update, the GDP has grown 12.8 percent, and more than 40 percent since 2010, as shown in **Figure 2.70**.

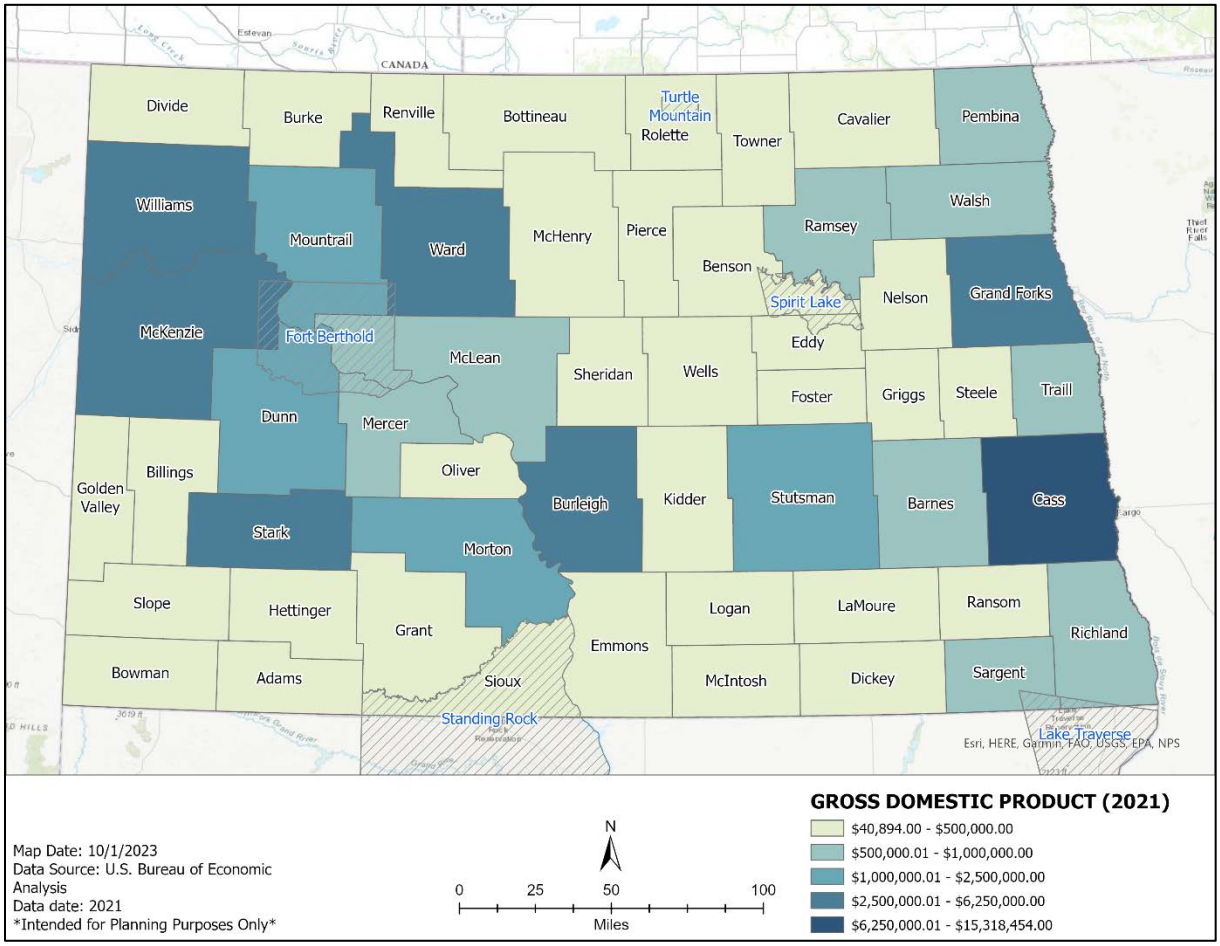
Figure 2.70: North Dakota GDP

2021 GDP	Growth Since 2017	Growth Since 2010
$63,559,623	12.8%	43.9%

Source: American Community Survey, 2023

Figure 2.71 shows the GDP by county and **Figure 2.72** provides highlights from the map (American Community Survey, 2023). The northwestern counties of McKenzie, Dunn, and Billings that comprise the Bakken region, have the highest increase in GDP, but areas like Sargent County in southeast North Dakota and Eddy and Towner counties in north-central also experienced sharp rises in GDP. Just two counties (Sheridan and Slope) had a GDP decrease exceeding 25 percent.

Figure 2.71: North Dakota GDP by County



Source: U.S. Bureau of Economic Analysis, 2021

North Dakota has a diverse economy. As in most small states, the largest employment sector is Government and Government Enterprises (17 percent), followed closely by Healthcare and Social Assistance (13 percent). No other economic sector has more than 10 percent of the employed citizens in the state, as shown in **Figure 2.73** (Office of Trade and Economic Analysis, 2022). **Figure 2.74** shows a map of the dominant employment sector in each county. While many counties mimic state employment figures, there are counties with notable dominant sectors, including Manufacturing in Sargent, Richland, Foster, and Morton; and Mining and Extraction in Dunn, McKenzie, Mountrail, Stark, and Williams; and Construction in Steele (Office of Trade and Economic Analysis, 2022).

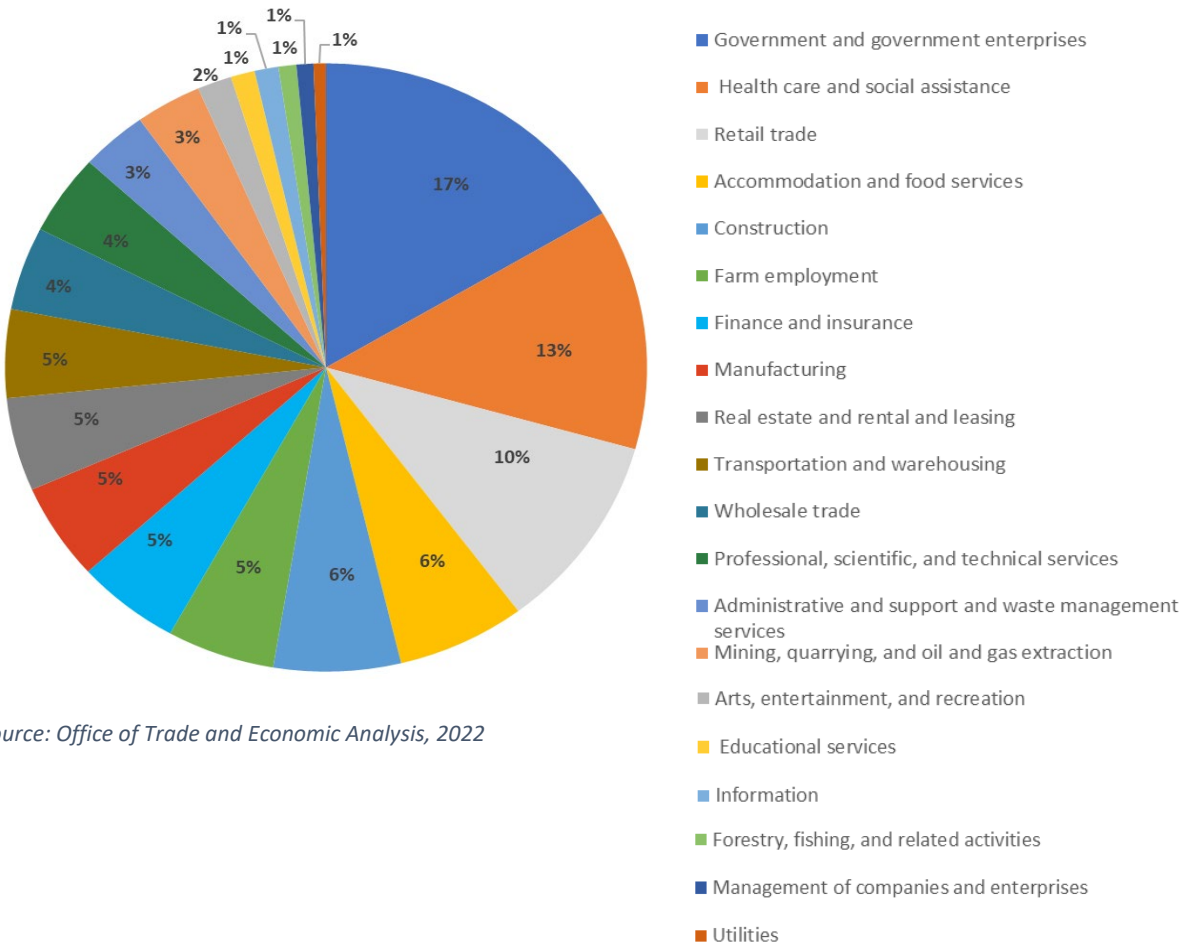
Figure 2.72: Counties with Significant Change in GDP, 2017-2021

County	Increase
McKenzie County	86.1%
Dunn County	82.4%
Billings County	65.1%
Sargent County	63.3%
Mountrail County	59.0%
Eddy County	51.1%
McHenry County	50.4%
Towner County	50.4%

County	Loss
Sheridan County	-63.3%
Slope County	-29.2%

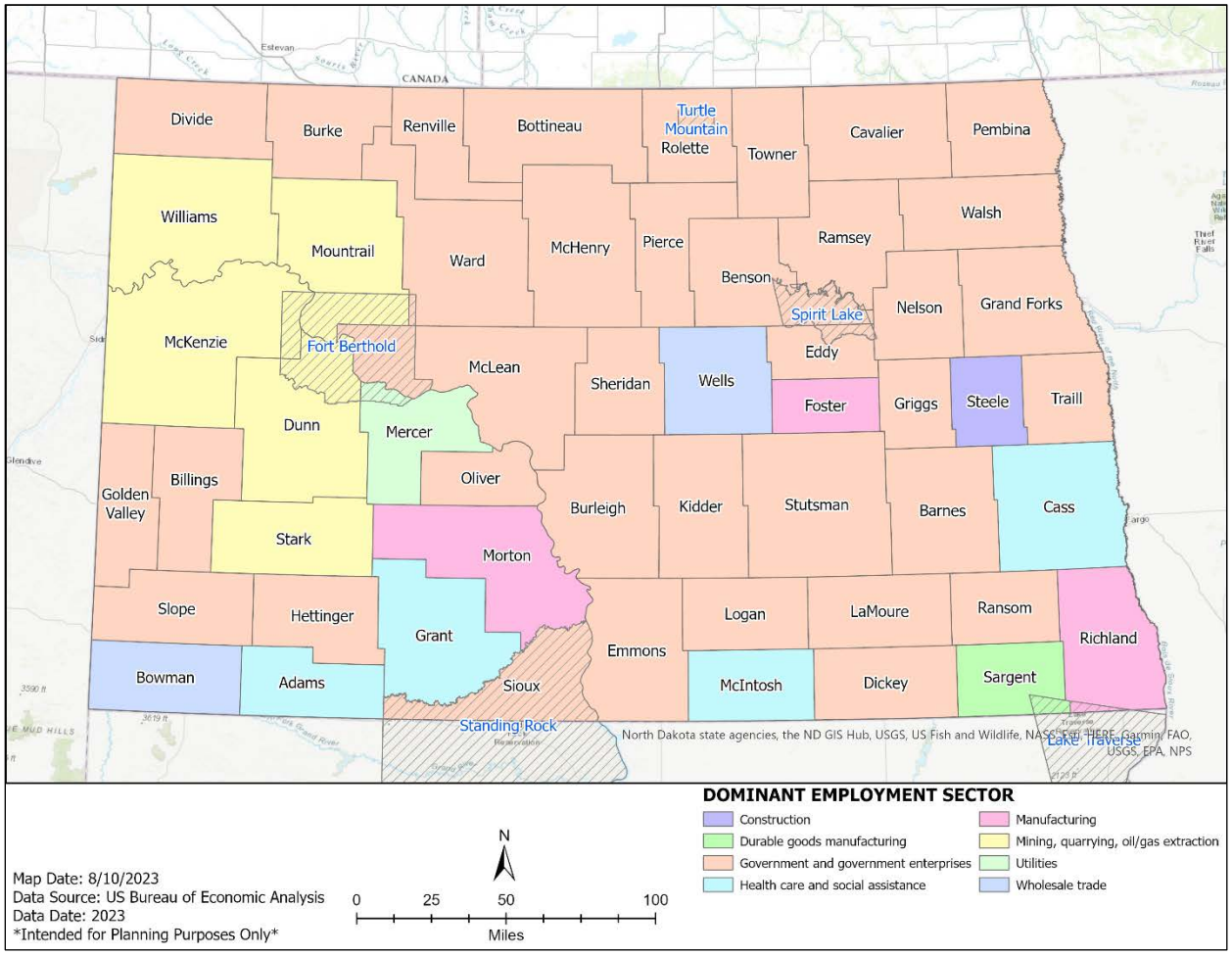
Source: American Community Survey, 2023

Figure 2.73: North Dakota Employment by Industry, 2021



Source: Office of Trade and Economic Analysis, 2022

Figure 2.74: North Dakota Dominant Employment Sector by County, 2021



Source: U.S. Bureau of Economic Analysis, 2021

As a state with vast stretches of arable land, North Dakota has a substantial agricultural economy, with $259,091,000 in farm compensation in 2020 across the state. The counties with the highest farm compensation are shown in **Figure 2.75**. Counties in the Red River Valley generally have the highest farm compensation (Bureau of Economic Analysis, 2020).

Figure 2.75: Leading counties for Farm Compensation, 2020

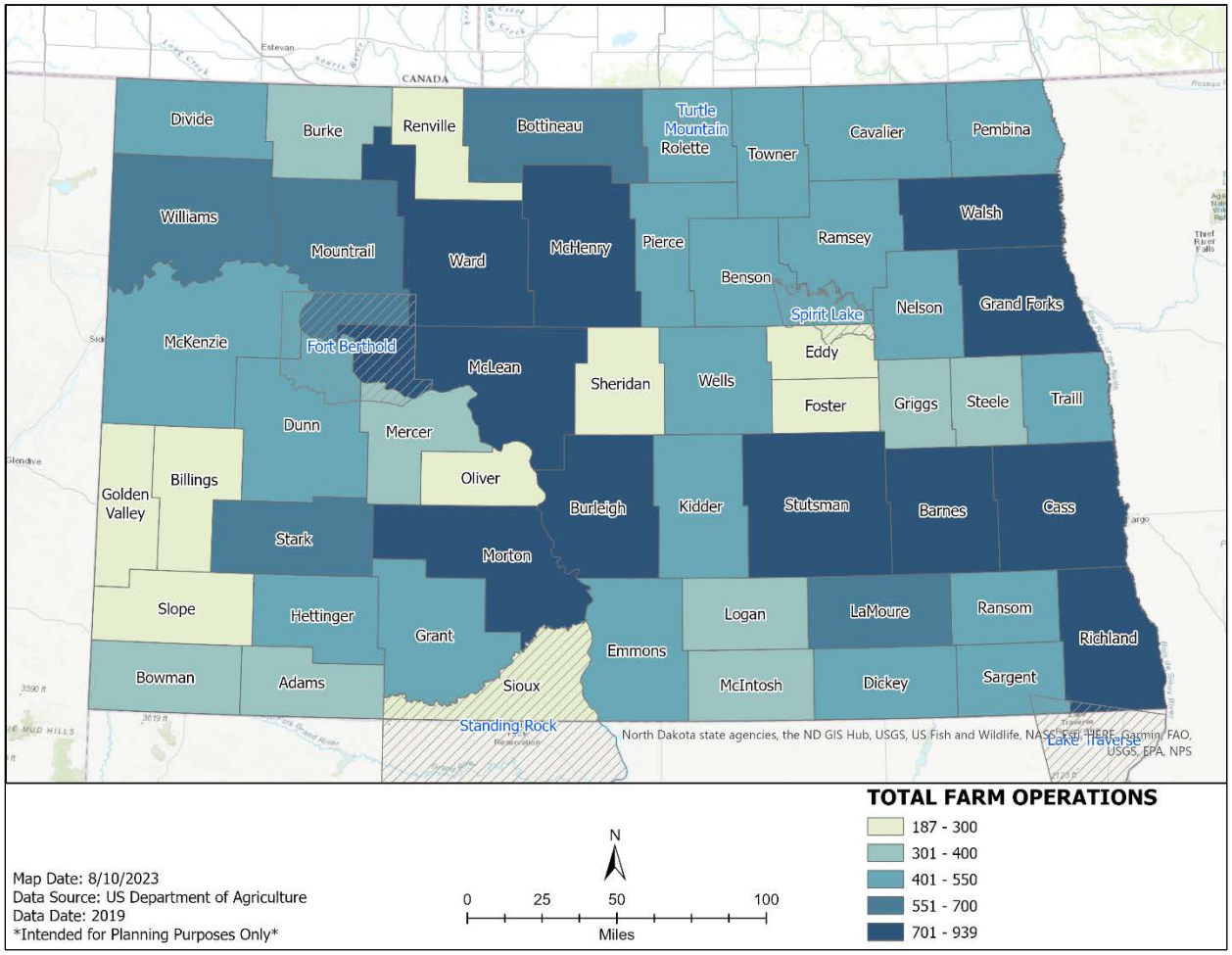
County	Farm Compensation
Walsh County	$21,595,000
Pembina County	$16,342,000
Grand Forks County	$15,955,000
Cass County	$14,815,000
Richland County	$14,267,000
Stutsman County	$10,970,000
Trail County	$9,235,000
Barnes County	$9,118,000

Source: Bureau of Economic Analysis, 2020

Figures 2.76, 2.77, 2.78, and 2.79 demonstrate the agricultural economy in three different ways. **Figure 2.76** shows the number of farms by county in the USDA's 2019 Agricultural Census, and **Figure 2.77** shows the livestock operations from the same dataset (USDA Ag Census, 2019). Farm operations are most plentiful in Stutsman (939), Grand Forks (889), and Richland (846) counties with a slight gradient in operations that is heaviest in the south and east. Stutsman County also ranks second on the list of livestock operations with 415, joining an otherwise

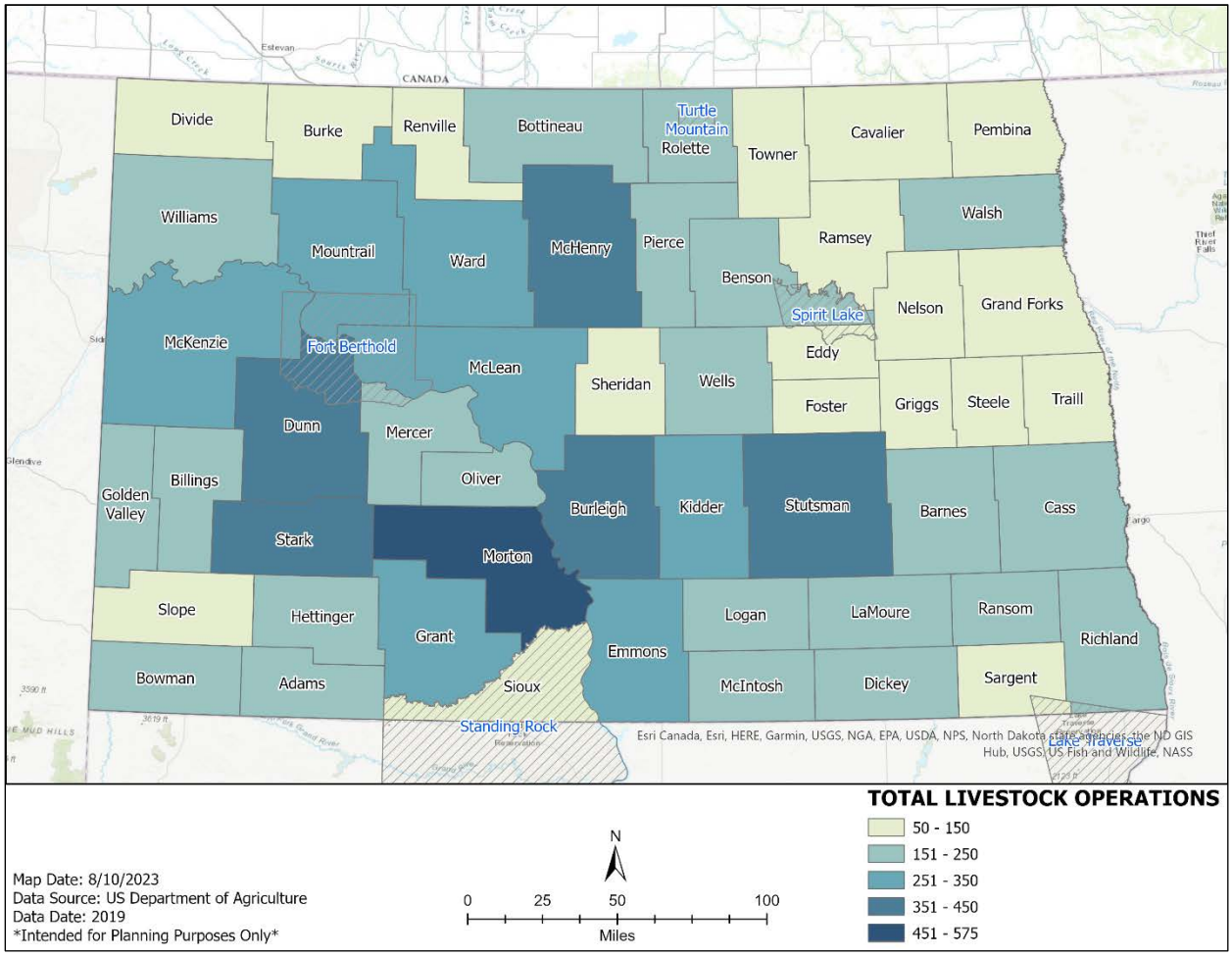
slight gradient that is heaviest in the north and west (USDA Ag Census, 2019). In **Figure 2.78**, the number of farm acres in each county is shown. Stutsman County leads the state in this measure of agricultural economy as well, as it services 1,315,703 acres in agriculture, which represents 89.5 percent of its total area (USDA Ag Census, 2019).

Figure 2.76: Farm Operations by County, 2019



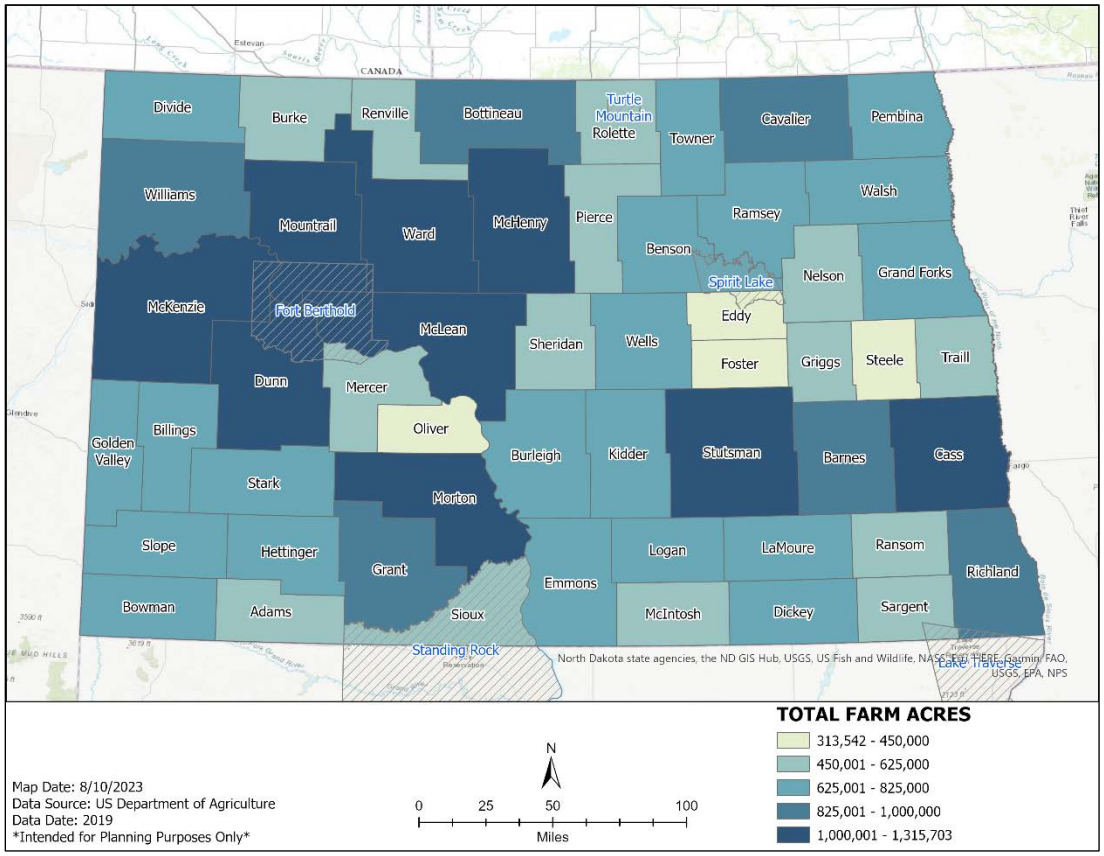
Source: U.S. Department of Agriculture, 2019

Figure 2.77: Livestock Operations by County, 2019



Source: U.S. Department of Agriculture, 2019

Figure 2.78: Farm Acreage by County, 2019



Source: U.S. Department of Agriculture, 2019

Income dependence on farming is another way of examining the possible impact of agricultural loss on a county. There are four counties in North Dakota, shown in **Figure 2.79**, that rely on farming for 10 percent or more of the county's total income. In Slope County more than $1 out of every $5 earned (21.4 percent) comes from farming (Bureau of Economic Analysis (BEA), 2021). The BEA defines a farm as any place from which at least $1,000 in agricultural products were produced and sold or normally would have been sold during a Census year.

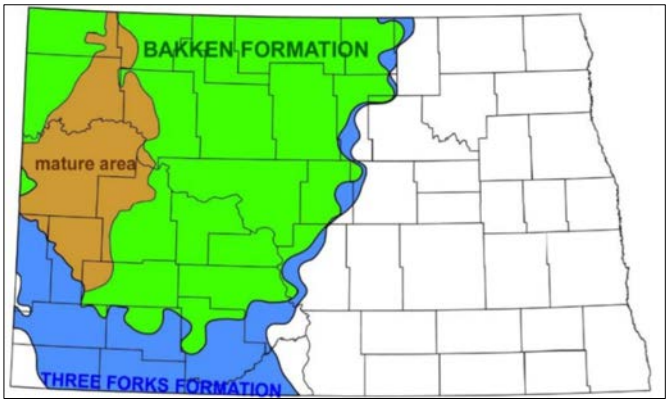
Figure 2.79: Counties with more than 10 Percent of Income from Farming

Description	Farming Income Total
Slope County	21.4%
Kidder County	12.6%
Steele County	11.6%
Sheridan County	10.8%

Source: Bureau of Economic Analysis, 2021

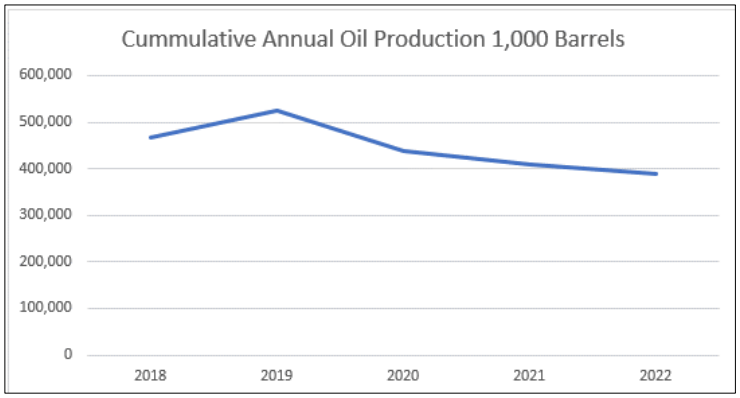
Increasingly, the energy industry has become a major contributor to the North Dakota economy since the initial discovery of oil in 1951 and the advances of technology in the Bakken petroleum system in the mid-2000s. Since 2015, volatility in oil prices decreased the number of oil workers. The North Dakota Legislature worked to enact incentives that helped to counteract those effects and stabilize oil worker numbers. While oil is not underfoot throughout the state, the oil-producing region includes a substantial portion of the state, as shown in **Figure 2.80**. The mature area of the Bakken is where the initial boom hit, but the rest of the Bakken and Three Forks areas can all turn a profit with new technology processes. Efficiency increases means that what took 218 wells to produce when the boom took off can now be produced from 40 efficient wells. This has created a more reliable and consistent level of crude oil production across fewer wells, and a stabilization of local population and housing needs (Oil & Gas Committee Discussion, 2023). **Figure 2.81** shows annual production of crude oil as reported by the North Dakota Department of Mineral Resources (2023).

Figure 2.80: Bakken and Three Forks Formation with Mature Oil Drilling Area



Source: North Dakota Geological Survey, 2023

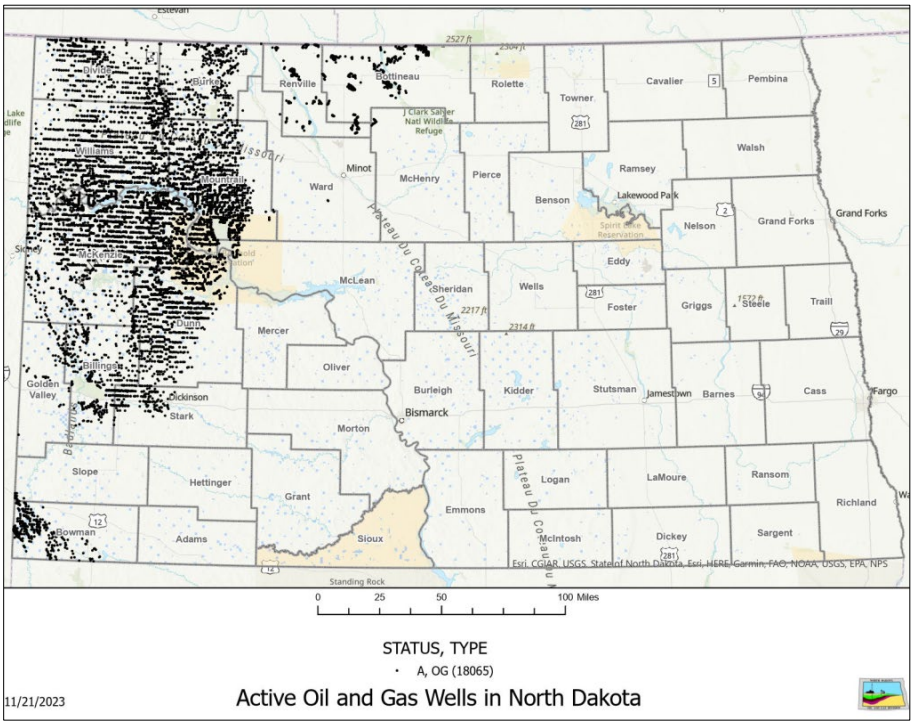
Figure 2.81: North Dakota Crude Oil Production



Source: North Dakota Department of Mineral Resources, 2023

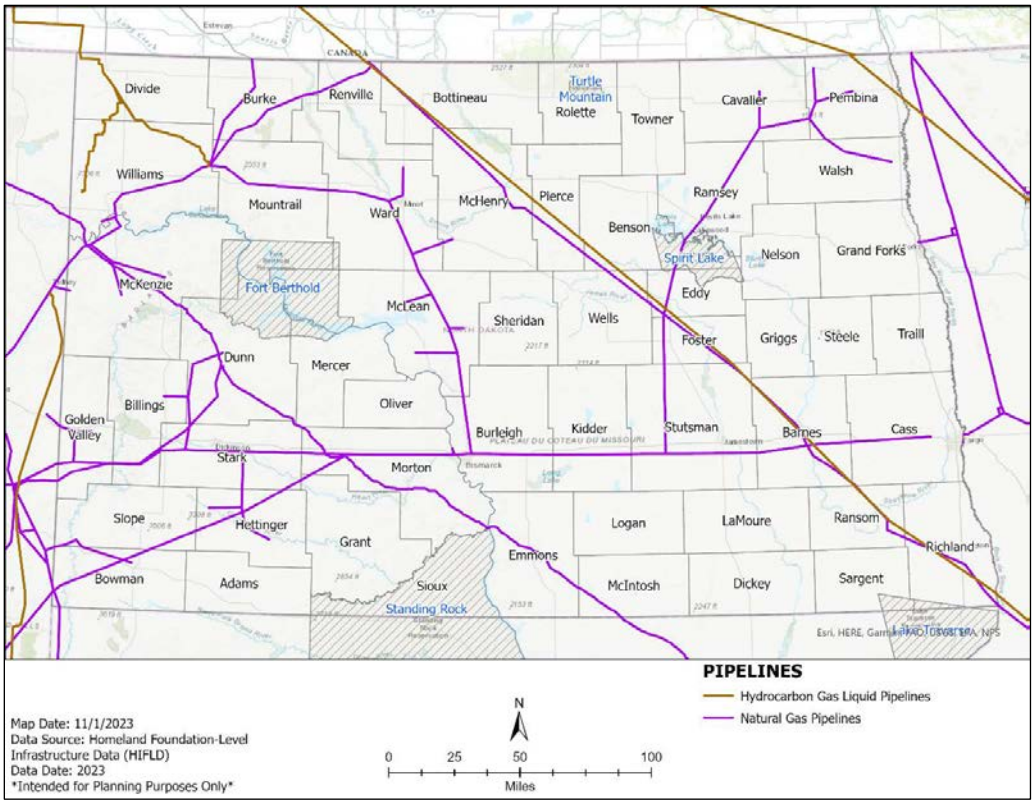
The energy economy is a growing sector of the North Dakota economy. According to the North Dakota Department of Mineral Resources, the 2022 annual average of oil and gas wells in the state amounted to 16,881. **Figure 2.82** displays the locations of oil and gas wells, which are predominately found in the northern and western portions of the state. Efforts to increase the safe transportation of products have increased since the last plan. Pipelines, shown in **Figure 2.83**, and mid-stream infrastructure have reduced the number of trucks on the road transporting oil and its byproducts, as well as reducing the miles each truck is driving. Expansion of highway in the Bakken region have included added travel lanes, roundabouts and turning lanes. Improved monitoring of wells in and near floodplains contributes to an improved safety environment since the last plan (Oil and Gas Committee, 2023). These efforts continue to reduce the risk for transportation incidents.

Figure 2.82: Oil Production Wells in North Dakota, 2023



Source: ND Geological Survey, 2023

Figure 2.83: Pipelines in North Dakota by Product Carried, 2023



Source: Homeland Foundation-Level Infrastructure Data, 2023

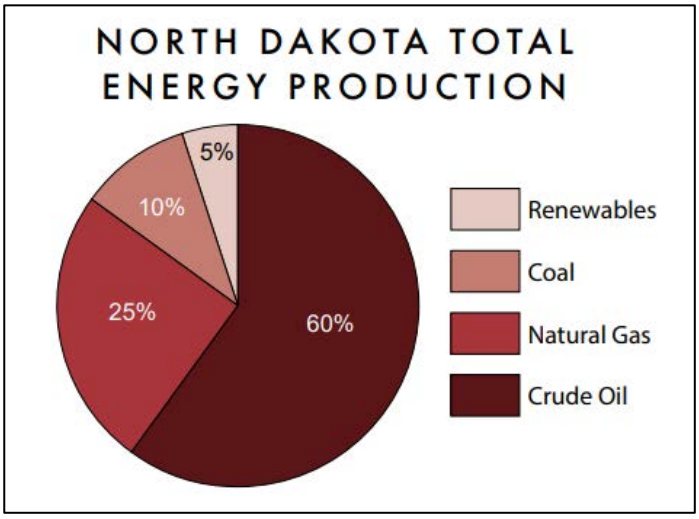
Before the crude oil boom and fracking technologies, there had been energy production in North Dakota. Bottineau, Renville, Bowman, and McHenry counties had long had more traditional oil production. The state also has the second largest lignite coal reserves in the country, and the area between Lake Sakakawea and Bismarck, which includes Mercer, Oliver, and McLean counties, includes several surface coal mines, like the Falkirk Mine near Underwood is shown in **Figure 2.84** (Energy Information Administration, 2023).

Figure 2.84: Falkirk Mine, McLean Co.

Source: Carrie Beth Lasley/AtkinsRealis

Today, North Dakota is third in the nation in oil production, behind Texas and New Mexico, and produces more than just crude oil, as shown in **Figure 2.85**, making North Dakota one of the most diverse state energy economies. State requirements around safety and spill reporting make North Dakota a relatively safer place to work in oil production when compared to other states. CARES Act money, related to COVID-19, was spent on reclamation efforts, and the state is pursuing Infrastructure Investment and Jobs Act funding to address orphan wells, demonstrating a statewide emphasis in making the energy sector safe and efficient (Oil & Gas Committee, 2023).

Figure 2.85: Energy Economy of North Dakota



Source: North Dakota Department of Commerce, 2023

Looking at compensation, in extraction industries, in **Figure 2.86**, shows that Bakken counties, coal country, and more traditional extraction all produce significant income for North Dakota workers in the industry, as well as forming the backbone of tax resources for local communities (Bureau of Economic Analysis, 2021).

Figure 2.86: Compensation in Mining, Quarrying, and Oil and Gas Extraction (from manufacturing), 2021

County	Compensation
Williams County	$ 654,164,000
Stark County	$ 228,611,000
McKenzie County	$ 209,471,000
Mountrail County	$ 142,060,000
Ward County	$ 132,804,000
Mercer County	$ 83,432,000
Dunn County	$ 67,189,000
Bottineau County	$ 20,657,000
Burleigh County	$ 19,118,000
Morton County	$ 6,668,000
McHenry County	$ 5,632,000

Source: Bureau of Economic Analysis, 2021

Figure 2.87: Leading Areas for Manufacturing Compensation

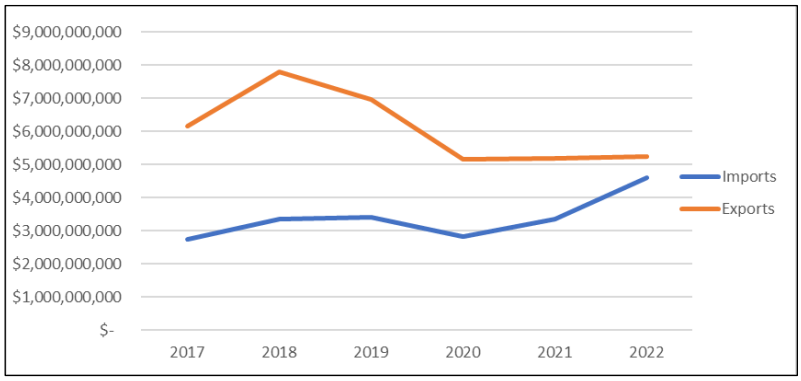
County	2021
Cass County	$ 722,625
Grand Forks County	$ 179,203
Richland County	$ 147,600
Burleigh County	$ 127,127
Stark County	$ 125,875
Morton County	$ 114,375
Stutsman County	$ 91,807

Source: Bureau of Economic Analysis, 2021

Advanced manufacturing is another sector of North Dakota's economy that is growing, with a 71 percent growth in the sector between 2011 and 2021, according to the North Dakota Department of Commerce (2021). With $4.63 billion in manufacturing output in 2021 and $2,046,270 in compensation, manufacturing is not just a growth industry for employment, but for exports as well (North Dakota Department of Commerce Manufacturing Fact Sheet, 2021). Thirty of North Dakota's 53 counties have a manufacturing component in their local economy, with the state's urbanized areas leading this sector, as shown in **Figure 2.87** (Bureau of Economic Analysis, 2020).

Both imports and exports have been growing for the state since the end of COVID-19. North Dakota experienced a 35 percent expansion in exports, leading the nation in 2018, and then declining before leveling off a little with the onset of the pandemic, as shown in **Figure 2.88** (North Dakota Trade Office, 2023).

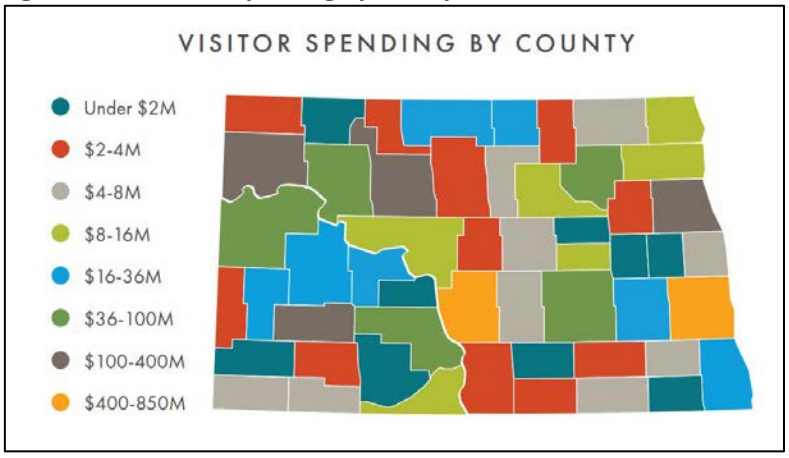
Figure 2.88: North Dakota Imports and Exports



Source: North Dakota Trade Office, 2023

Tourism is also a growth sector for North Dakota, which recorded a record number of campers in 2020, primarily from in-state campers (North Dakota Tourism, 2020). Generally, urbanized areas lead the way in tourism, as shown in **Figure 2.89**, with Cass and Burleigh counties leading all other areas (North Dakota Department of Commerce, 2022).

Figure 2.89: Tourism Spending by County



Source: North Dakota Department of Commerce, 2022

COVID-19 led to an increase in tourism in state and national parks that fell off slightly in favor of indoor activities in 2022, as shown in **Figure 2.90** (North Dakota Department of Commerce, 2022).

Figure 2.90: Tourism by Segment

Travel Segment	2021	2022	+/-
State Park Visitors	1,344,741	1,135,538	-16%
National Park Visitors	826,099	698,119	-15%
Major Attractions	3,999,505	4,108,799	3%
Local Visitor Centers	52,375	49,994	-5%
Cumulative Lodging Tax	$5,552,640	$7,350,904.14	32%
ND Airport Deplanements	887,804	1,023,816	15%
Canadian Border Crossing	96,219	298,463	210%
Statewide Hotel Occupancy Rate	47.7%	52.9%	11%

Source: North Dakota Department of Commerce, 2022

North Dakota is also growing its economy. In total, 17 sectors added jobs in the past decade (U.S. Census Bureau, 2020). **Figure 2.91** shows new firms, and their job totals as reported to the Census Bureau in 2020. Food and accommodations added the most jobs, but Professional Services, Construction, Healthcare and Social Services, and Other Services have outpaced food in the number of new firms. In total, 17 sectors added jobs in the past decade (U.S. Census Bureau, 2020).

Figure 2.91: New Firms and Job Creation by Sector from 2010-2020

Sector	New Firms	Jobs Created
Accommodations and Food	104	984
Retail Trade	90	606
Healthcare and Social Assistance	108	568
Construction	128	373
Professional Services	136	328
Mining	33	323

Sector	New Firms	Jobs Created
Transportation and Warehousing	97	300
Other Services (except Public Admin)	106	286
Real Estate and Rental	68	281
Wholesale Trade	32	218
Administration, Support and Waste	50	181
Manufacturing	24	134
Arts, Entertainment and Recreation	18	83
Information	3	67
Finance and Insurance	36	67
Educational Services	10	40
Agriculture	4	6
Total	**1,047**	**4,845**

Source: U.S. Census Bureau, 2020

2.2.3 State Assets and Critical Infrastructure

The state is heavily invested in protecting the facilities and structures owned by the state from the threat of hazards. In addition to the cost of repairs, damage to state property can lead to a disruption in government services and/or the economy at large.

2.2.3.1 State Structures

Not all government agencies operate in structures owned by the state; some may lease from private entities. The North Dakota Insurance Reserve Fund provides insurance coverage for structures and contents (North Dakota State Fire and Tornado Fund, 2023). These policies are updated annually and represent the replacement or cash values of state property, and thus are likely the best representation of the value of state property.

Figure 2.92 is a summary of the data in Appendix D.7, which is the properties covered by the Fire and Tornado Fund (North Dakota State Fire and Tornado Fund, 2023).

Figure 2.92 Summary of State Fire and Tornado Policies, 2023

Category	Facility Count	Insured Amount
Research Centers	311	$1,409,329,077
Colleges and Universities	696	$902,237,057
Other State Agencies	488	$611,470,749
Legal Administration	358	$370,288,786
Correction and Rehabilitation	126	$240,899,588
Healthcare Administration	46	$177,756,586
Transportation	273	$135,901,807
Recreation, Tourism and Public Lands	344	$68,577,561
Professional Service Administration Agencies	54	$52,796,353
Historical Properties and Administration	92	$48,719,050
Veterans Services	11	$42,481,097
K-12 Education Administration	22	$23,312,686

Category	Facility Count	Insured Amount
Agriculture Department and Boards	14	$4,902,700
Total	**2835**	**$4,088,673,097**

Source: North Dakota State Fire and Tornado Fund, 2023

In addition to buildings, structures like communications towers, emergency medical service stations, water treatment plants and levees can be considered critical infrastructure. These public structures join some private facilities such as power substations as necessary built features that enable life as we know it to persist. An overview of state-identified critical infrastructure is identified in **Figure 2.93**.

Figure 2.93: North Dakota Critical Infrastructure Overview

Facility Class	Facility Type	Total
Communications	Cell Towers	614
	Communication Towers	2,711
Emergency Services	Law Responders	1,324
	Fire Responders	9,673
	Emergency Medical Service Stations	287
	Public Safety Answering Points	21
Water	Water Treatment Plants	4
	Rural Water Districts	24
	Regional Water Associations	3
	Levees	215
Energy	Natural Gas Compression Stations	36
	Ethanol Plants	5
	Oil Wells	10,438
	Wind Turbines	2,118
Waste	Landfills	55
	Wastewater Treatment Plants	8
Public Health	Hospitals	58
	Long-term Care Facilities - Assisted Living	75
	Long-term Care Facilities - Skilled Nursing	80
	Long-term Care Facilities - Basic Care	65
	Pharmacists	893
Transportation	Airports	309
	Commercial Airports	5
Government	Schools	448
	Colleges	19
	Courthouses	63
	Prisons	5
	Jails	23
Financial Institutions	Bank of North Dakota	1
	Department of Financial Institutions	3

2.2.3.2 Food/Agriculture

As discussed in the economy section, agriculture is a critical component of the North Dakota economy. North Dakota's agricultural economy is not just critical to the financial stability of the state and its residents, but food production from North Dakota is critical to the nation. The state leads the country in agricultural production of several products, including spring wheat, sunflower, honey, dry beans, pinto beans, canola, flaxseed, and peas; and there are 1.2 cattle for every 1 person in North Dakota (North Dakota Department of Commerce, 2023).

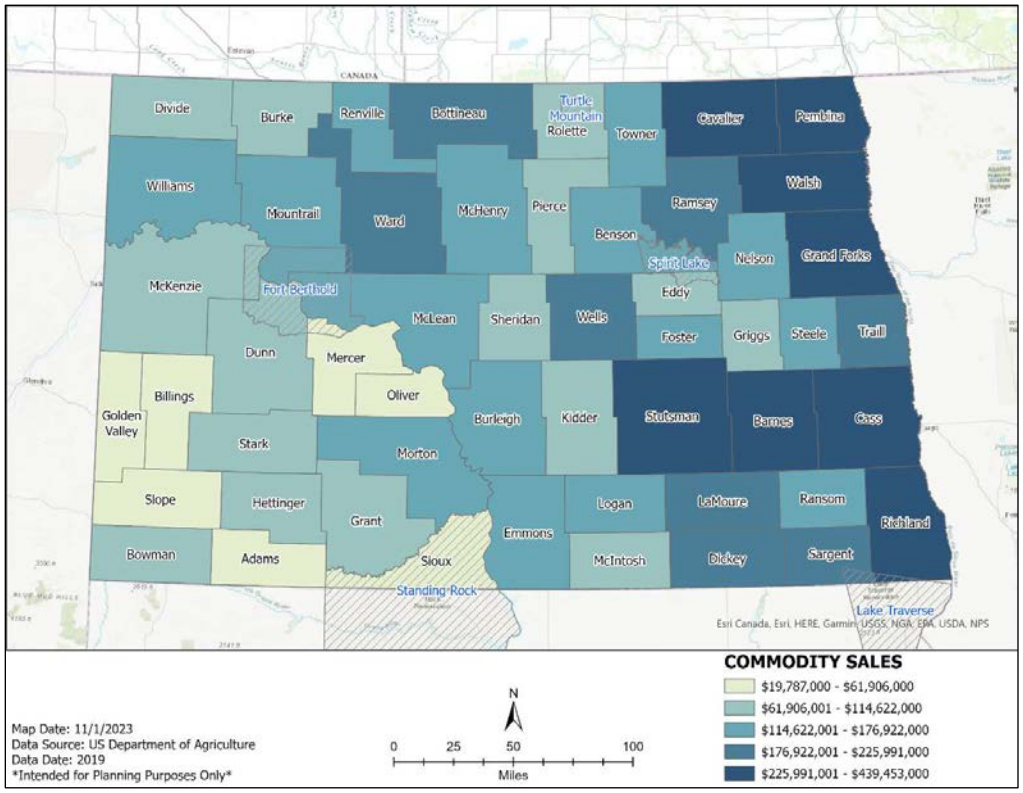
Figure 2.94: Top Counties by Crop Value

County	Crop Sales	Operations	Crop Acres
Cass	$ 417,188,000	727	1,085,430
Richland	$ 354,985,000	791	822,988
Walsh	$ 323,415,000	707	720,275
Grand Forks	$ 294,658,000	831	744,093
Stutsman	$ 286,065,000	829	1,048,238
Cavalier	$ 276,485,000	495	877,208
Pembina	$ 275,337,000	439	640,772
Barnes	$ 257,603,000	679	819,825
Trail	$ 223,748,000	391	526,077

Source: U.S. Census Bureau Agricultural Census, 2019

Figure 2.94 and Figure 2.95 show the total market value of crops sold by county, **with Figures 2.96 and 2.97** adding information about acres and operations. Every county in the state has at least some acreage in agricultural production, with eastern counties being the most productive (U.S. Census Bureau Agricultural Census, 2019).

Figure 2.95 Market Value of Agricultural Products Sold by County



Source: U.S. Department of Agriculture, 2019

A look at critical food categories in the state is another way to look at the importance that the state has in the national food economy. **Figures 2.96 and 2.97** summarize the areas of highest production in cereal grains and animal products. Grain and corn production dominate in the Red River Valley and animal products dominate in the central area and west (US Census Bureau Agricultural Census, 2019).

Figure 2.98 shows the distribution of all livestock.

Figure 2.96 Highest Corn and Grain Production by County

County	Operations	Acres	Bushels
Richland	442	305,542	53,717,222
Cass	383	308,952	49,723,902
Stutsman	293	216,020	30,267,908
Barnes	259	194,835	29,533,371
Sargent	206	162,661	27,323,896
Dickey	185	164,970	26,652,326
LaMoure	257	151,319	23,150,510

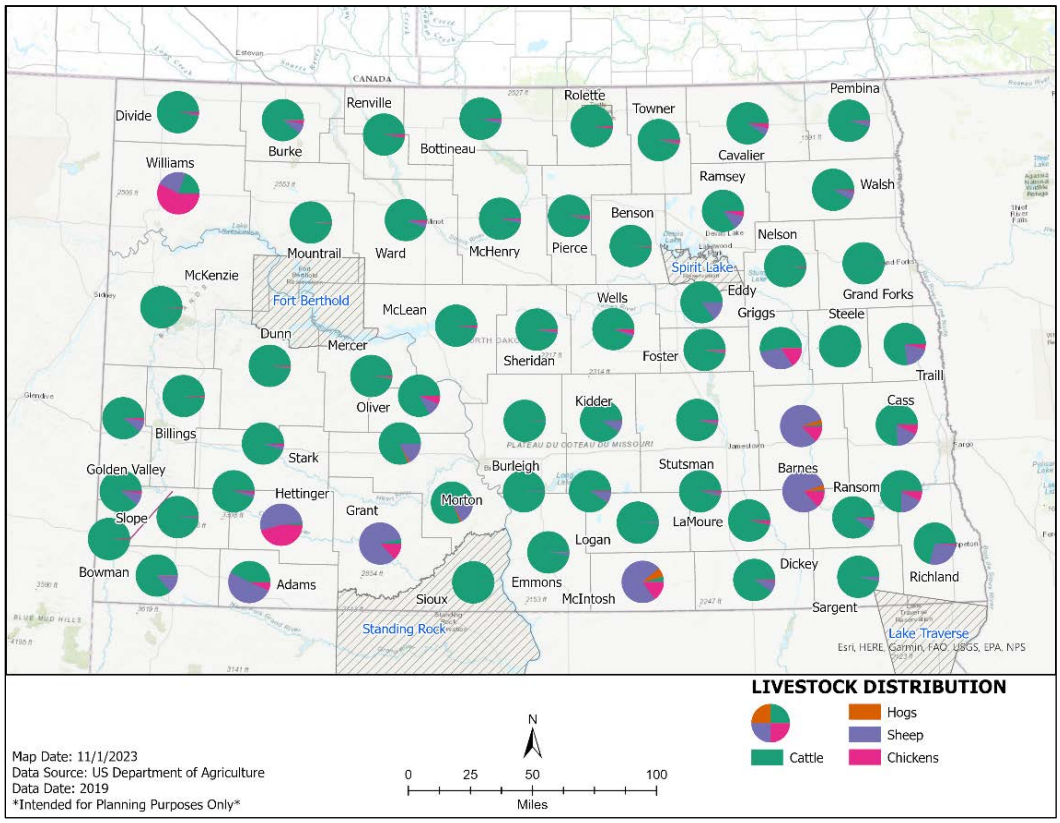
Source: U.S. Census Bureau Agricultural Census, 2019

Figure 2.97 Highest Animal Product Sales by County

County	Animal Product Sales	Operations
Logan	$ 100,011,000	351
Morton	$ 82,445,000	781
Burleigh	$ 68,725,000	785
McHenry	$ 64,151,000	750
Bowman	$ 54,526,000	341
McKenzie	$ 54,511,000	539
Grant	$ 53,935,000	412
Emmons	$ 50,296,000	516
Dunn	$ 49,901,000	524
Stutsman	$ 49,560,000	939

Source: U.S. Census Bureau Agricultural Census, 2019

Figure 2.98 Livestock Distribution, 2019



Source: U.S. Department of Agriculture, 2019

In addition to the production of food, North Dakota also processes a large amount of its own product. As shown in **Figure 2.99**, 14 North Dakota counties host 129 food processing facilities that employ 4,208 employees (Office of Trade and Economic Analysis, 2021).

Figure 2.99 Food Processing Establishments

County	Establishments	Employees
Cass	56	1,170
Grand Forks	13	641
Richland	8	589
Morton	9	520
McHenry	8	486
Stark	3	255
Ransom	3	145
Ward	6	87
Steele	4	82
Burleigh	6	77
Bottineau	3	48
Wells	4	46
Barnes	3	38
Williams	3	24

Source: Office of Trade and Economic Analysis, 2021

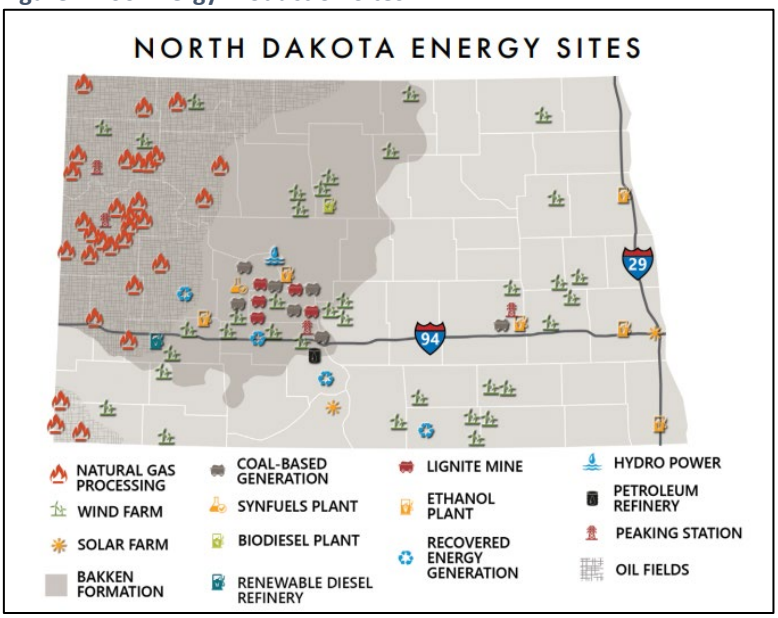
2.2.3.3 Energy

North Dakota is a net-exporter of energy. Private industry produces about six times more than it uses. (Energy Information Administration, 2023). The sources of energy production are very diverse.

Partially due to quantity and diversity of these features, North Dakotans have the fourth lowest electricity costs in the nation, but due to the need for heating and cooling, the state also has the third-highest per capita energy consumption. However, with a relatively small population, residential energy is just 6.6 percent of energy consumed in the state. Industrial consumption is the largest use sector, using 60 percent of energy consumed in the state (Energy Information Administration, 2023).

Figure 2.100 shows the locations of major energy generation sites. Most of the energy generated in the state comes from coal (57 percent), but 39 percent of electric generation in the state comes from renewable sources including wind (34 percent). This is the sixth-highest proportion from renewables in the nation. **Figure 2.101** shows the generation from North Dakota plants (Energy Information Administration, 2023).

Figure 2.100 Energy Production Sites



Source: North Dakota Department of Commerce, 2023

Energy processing is a growing sector in North Dakota. In 2023, there are 33 natural gas processing facilities, 15 major crude oil pipelines, two oil refineries, and five ethanol oil production plants. On top of being third in the nation in crude oil production, North Dakota is fifth in the nation in coal production, producing 5 percent of the nation's

coal. The state also produces 3 percent of the nation's ethanol fuel and has 3 percent of the nation's natural gas reserves (Energy Information Administration, 2023).

Figure 2.101 Power Generation in Megawatt Hours (2022)

Plant	Coal	Distillate Fuel Oil	Natural Gas	Wind	Other
Antelope Valley	11,716,405		74,987		
Coal Creek	16,760,715	10,779			
Coyote	4,524,919	8,563			
Glen Ullin Energy Center				902,858	
Leland Olds	7,597,713	17,443			
Milton R Young	8,296,320	19,772			
R M Heskett	91,785		4,740		2,839
Spiritwood Station	191,043		5,553		
Tesoro Mandan Cogeneration			21,866		54,424

Source: Energy Information Administration, 2022

2.2.3.4 Public Health

At the request of the hospital, the American College of Surgeons (ACS, 2023) evaluates and accredits hospitals to determine if they have the resources for optimal care of the injured patient. If these resources are present, the hospital is designated a trauma center for adults and/or children. **Figure 2.102** shows the ACS designated trauma centers in the state. Of note, there are no trauma centers west of Minot, where there is a growing oil industry that can lead to burns and injuries (American College of Surgeons, 2023).

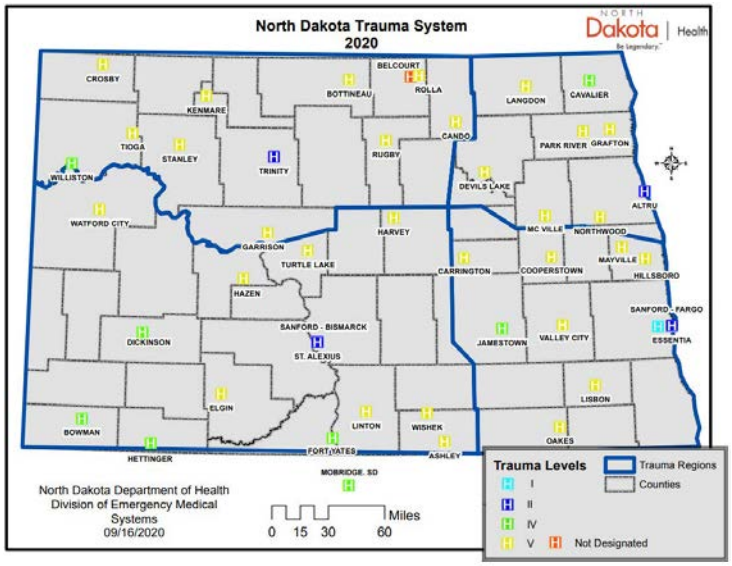
There are, however, hospitals in that region that work with the trauma centers. **Figure 2.103** shows the location of all trauma centers, including those ranked lower than Trauma II (North Dakota Department of Health Division of Emergency Services, 2020). Several Level IV and V trauma centers exist in the western counties). Note: The map incorrectly identifies one Level II trauma center

Figure 2.102 Trauma Centers in North Dakota

Trauma Center	Location	Services
Trinity Hospital	Minot	Level II
Sanford Medical Center Fargo	Fargo	Level I Adult, Level II Pediatric
CHI St. Alexius Health	Bismarck	Level II
Altru Health System	Grand Forks	Level II
Sanford Medical Center	Bismarck	Level II
Essentia Health	Fargo	Level II

Source: American College of Surgeons, 2023

Figure 2.103 North Dakota Trauma System

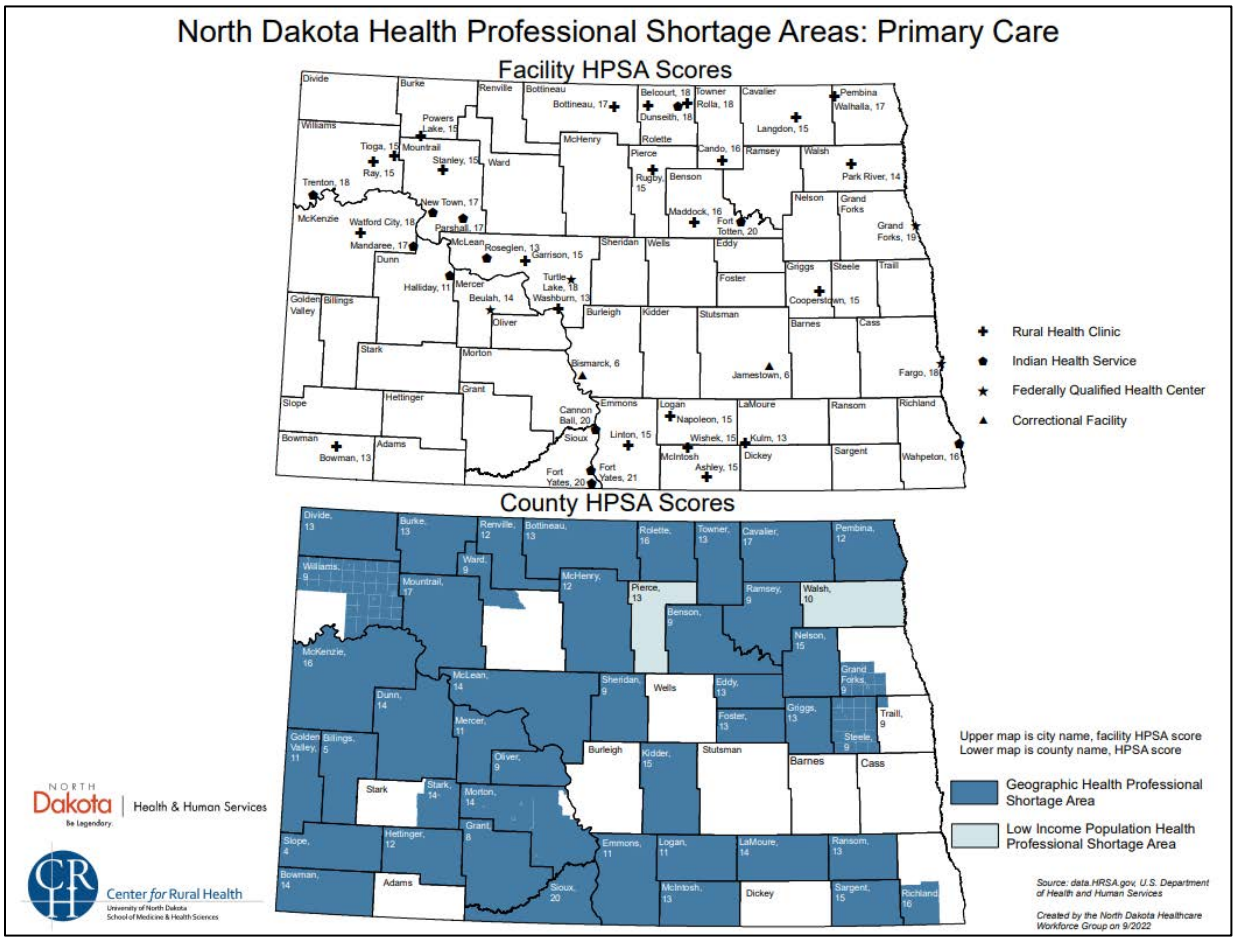


Source: ND Health and Human Services, 2023

in Bismarck when there are in fact two Level II trauma centers.

Additionally problematic for the growing population in Western North Dakota is the lack of primary care professionals available to the population, shown in **Figure 2.104**. More of the counties in the state are considered Health Professional Shortage Areas (HPSA) than not, but the major urban areas are all sufficient (University of North Dakota Center for Rural Health, 2022).

Figure 2.104: North Dakota Health Professional Shortage Areas

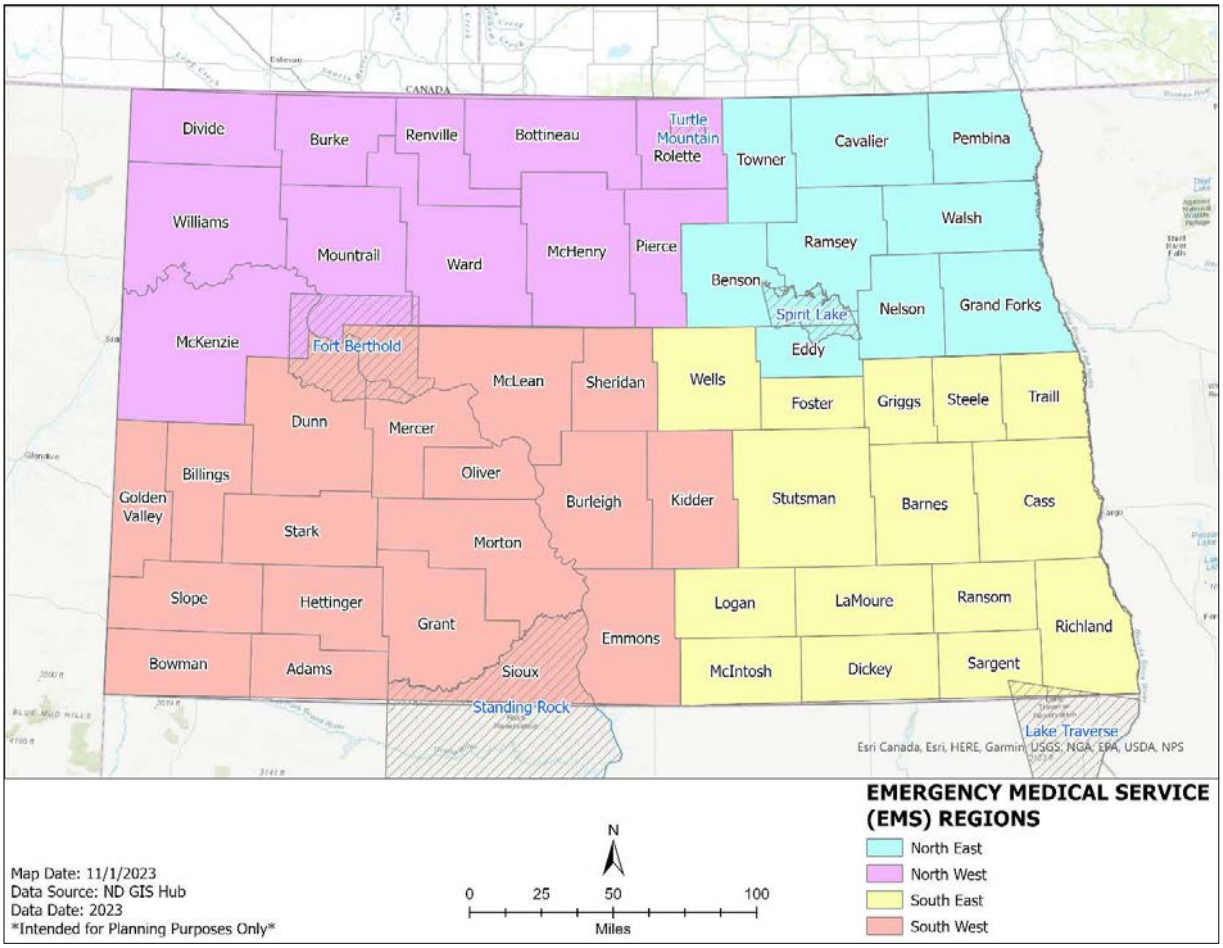


Source: ND Health and Human Services, 2023

2.2.3.5 Emergency Services

Emergency Medical Services boundaries are shown in **Figure 2.105**.

Figure 2.105: North Dakota EMS Services Areas



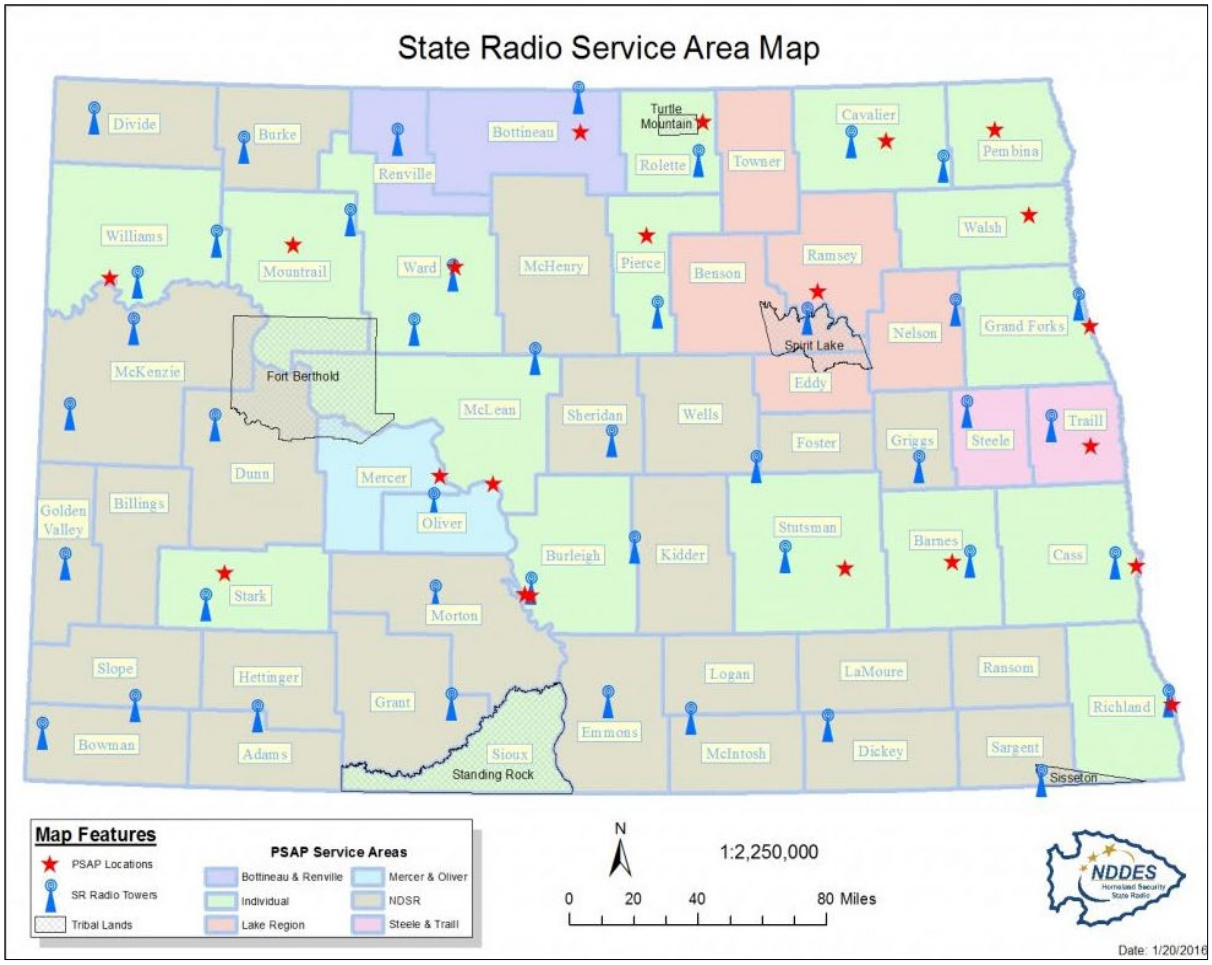
Source: NDDES, 2023

2.2.3.6 Communications

Radio communications are critical to fast and effective response to hazards. North Dakota's Division of State Radio coordinates 911 services and response. State Radio serves as the primary dispatch center for the North Dakota Highway Patrol, conducts communications for 25 counties, and supports 15 others as the public service answering point (PSAP). PSAP areas are shown in **Figure 2.106**. State Radio also serves law enforcement through response for vehicle information, warrant checks and license status. It also releases All Points Bulletins for serious crimes and hazardous material notification. More than 4,000 radio users across 287 agencies across all forms of government have access to a 24/7 communications center that, in addition to providing support, provides the following services:

- AMBER/Silver/Blue Alert Response
- Mobile Data Terminal Communication Systems
- National Crime Information Center (NCIC)
- National Law Enforcement Telecommunications System (NLETS)
- National Warning System (NAWAS)
- N.D. Law Enforcement Telecommunications System
- State Radio Communications System
- State warning point for the National Warning System (NAWAS) notification
- Statewide Paging System
- Statewide 9-1-1 and Emergency Telephone Systems
- Statewide Roadblock System
- Statewide Frequency Coordination System (North Dakota Department of Emergency Services, 2023).

Figure 2.106 State Radio Overview



Source: NDDES, 2023

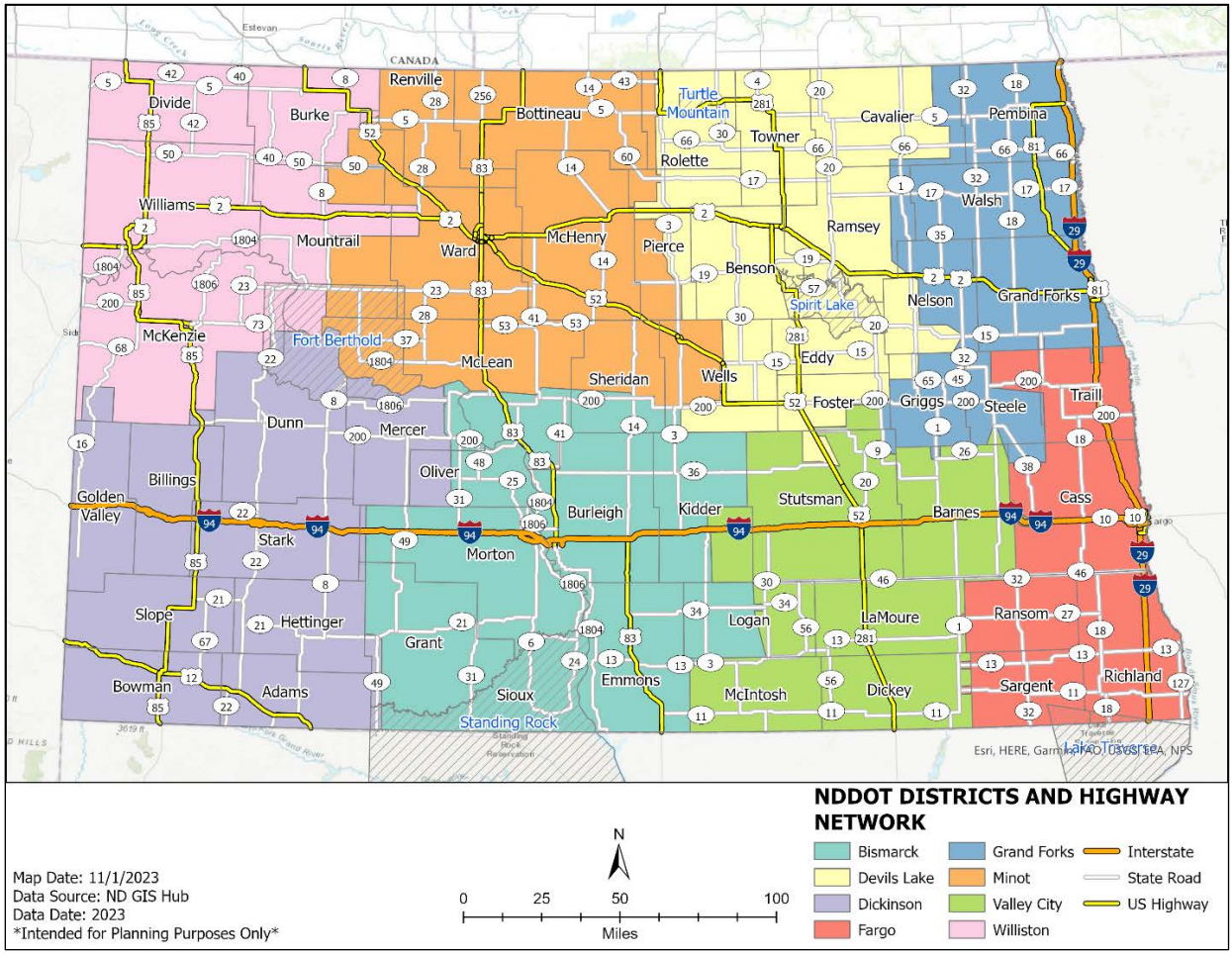
2.2.3.7 Transportation

In addition to pipelines used to transport material, as shown in Figure 2.57, North Dakota has transit, vehicle, air, pipeline and rail travel facilities and networks. These modes of transportation help move people and products throughout and outside of the state/country.

Figure 2.36, earlier in this document, provides an overview of the primary transit providers for each county. Not all transit providers serve the community in the same way. In urban areas such as Grand Forks, Bismarck and Fargo, routed transit with traditional city buses serves the public, but in rural areas, transit providers may provide a scheduled car service to users.

The major roadways, including the Interstate Highway System, are shown in **Figure 2.107**. Following the oil boom in 2006, policy changes prompted the North Dakota Department of Transportation to invest in land expansion and improvements in intersections to accommodate the growing needs of transport and workers in Western North Dakota.

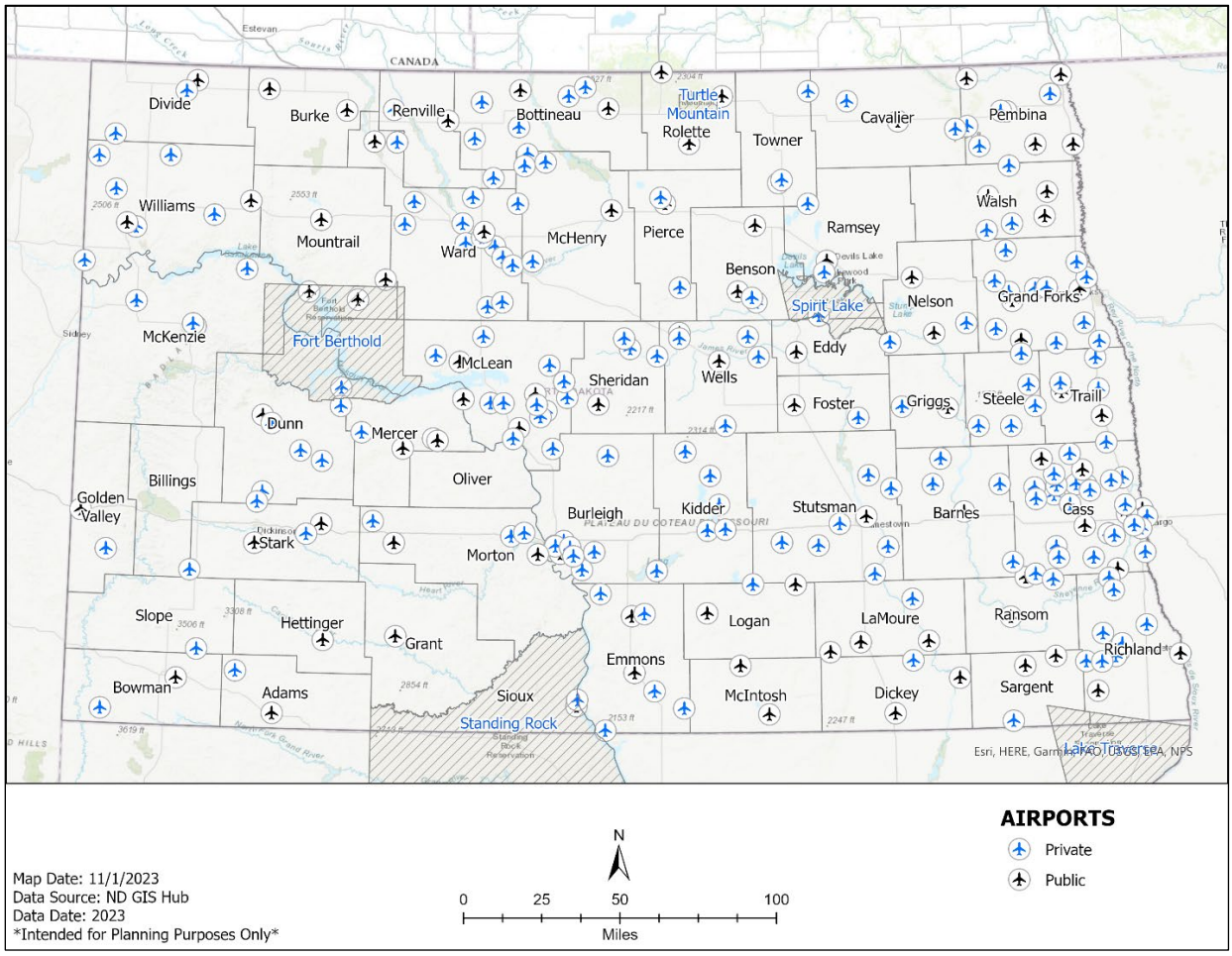
Figure 2.107 North Dakota Highway Network



Source: ND GIS Hub, 2023

North Dakota is served by seven primary commercial airports in the largest cities, as well as a non-primary commercial service in Devils Lake. There are also many general aviation airports. There are Air Force Bases located in Minot and Grand Forks. Aviation resources are shown in **Figure 2.108**. North Dakota has 89 Public Use Airports in the state, 81 of these are considered General Aviation Airports and eight are Commercial Service Airports. There are an additional 200 private airports throughout the state.

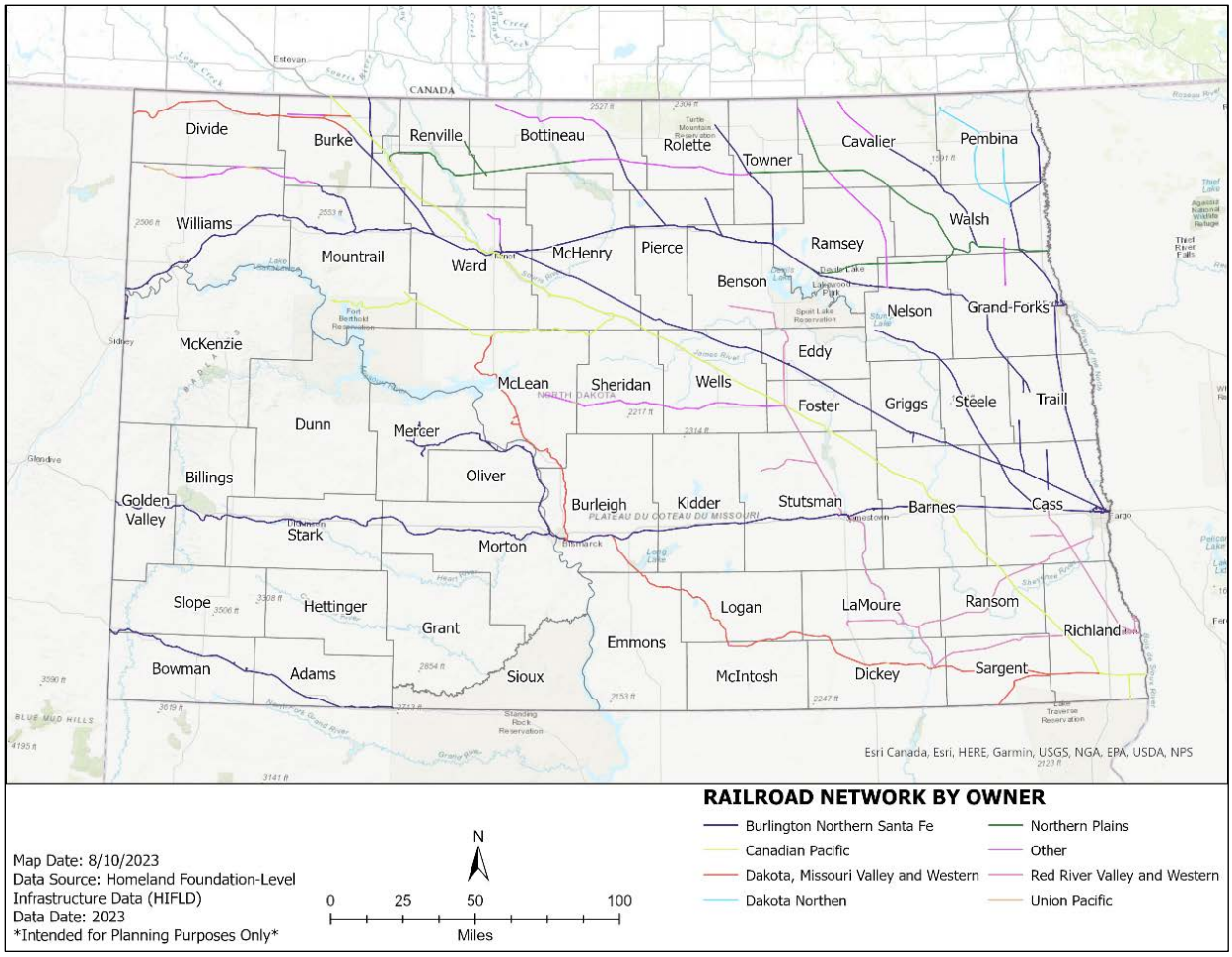
Figure 2.108 Aviation Resources



Source: ND GIS Hub, 2023

The railroad network is shown in **Figure 2.109**. Rail has been essential in getting agricultural products to market and for the import and export of goods. The state is served by two Class I railroads – Burlington Northern-Santa Fe (BNSF) and Canadian Pacific (CP). Four regional carriers help connect agricultural products to the main freight lines. These regional carriers are the Red River Valley and Western (RRVW), Dakota, Missouri Valley & Western (DMVW), Dakota Northern (DNR) and the Northern Plains Railroad (NPR). The regional carriers serve 299 grain elevators. Combined, these rail carriers operate along more than 3,000 miles of rail, with passenger service along the same tracks served by Amtrak's Empire Builder line (North Dakota Department of Transportation State Freight and Rail Plan, 2023). The Empire Builder has seven depots across northern North Dakota from Grand Forks to Williston. Between the major carriers there are 8 rail yards, 11 transload facilities and 1 intermodal facility, where rail freight is transferred into trucks.

Figure 2.109 Railroad Network

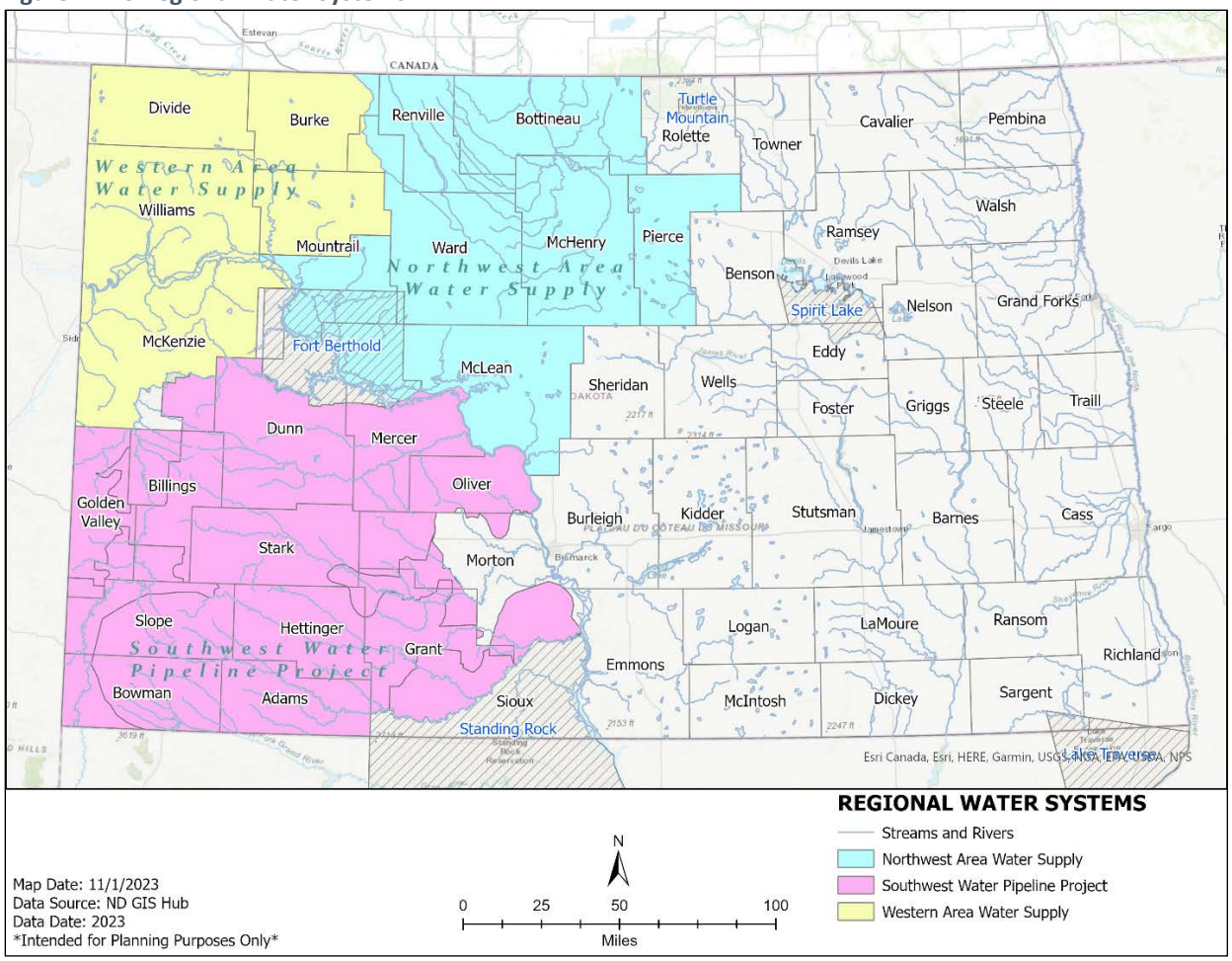


Source: Homeland Foundation-Level Infrastructure Data, 2023

2.2.3.8 Water

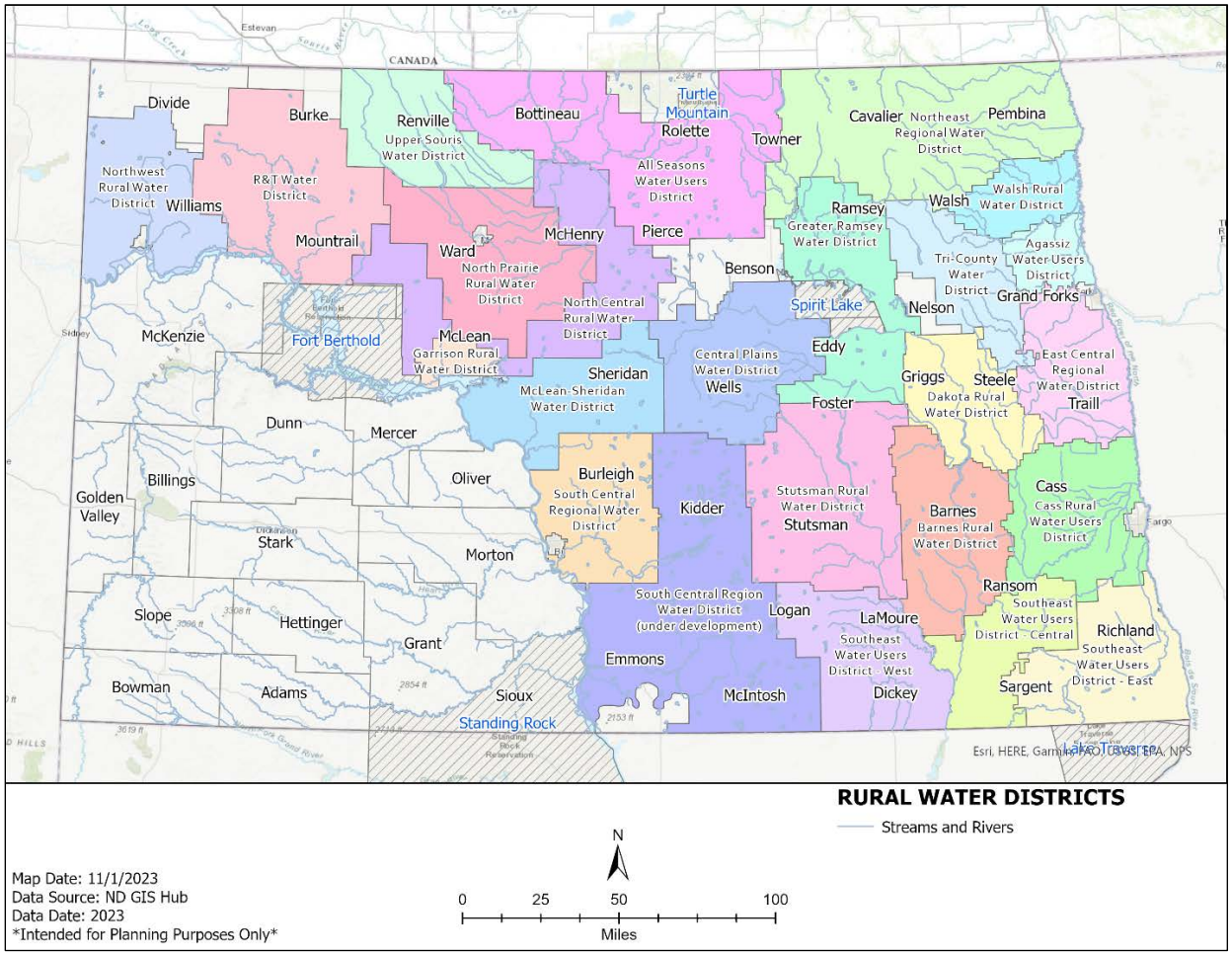
The North Dakota Department of Water Resources oversees the regulatory responsibilities for state waters, including drainage, dam safety, planning, and allocation of resources. **Figure 2.110** shows the regional water systems across the state while **Figure 2.111** displays rural water districts. Information on dams can be found in Section 4.8 - Dam Failure.

Figure 2.110 Regional Water Systems



Source: ND GIS Hub, 2023

Figure 2.111 Rural Water Districts



Source: ND GIS Hub, 2023

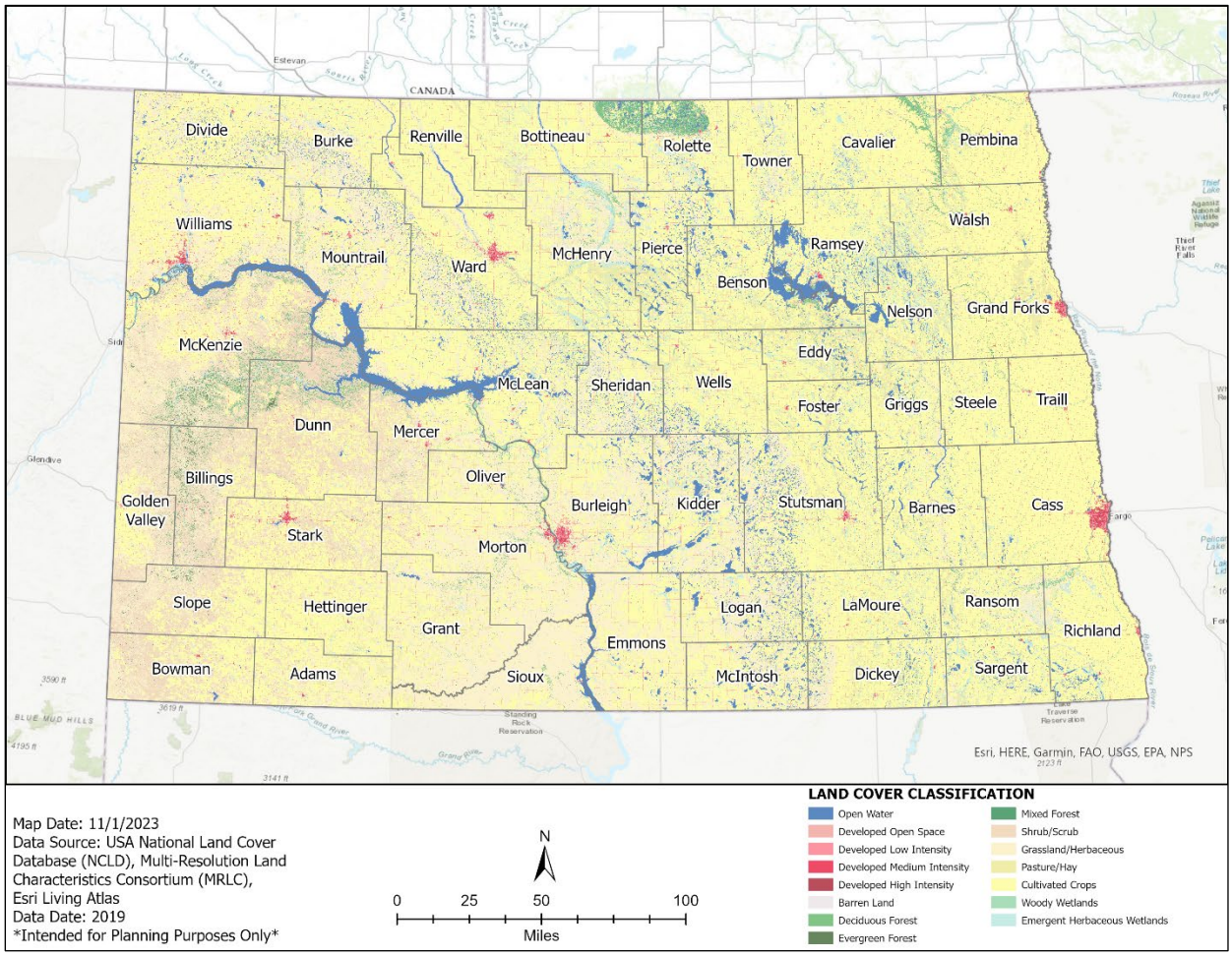
2.2.3.9 Other Critical Infrastructure, Facilities, and Key Resources

State and critical infrastructure sectors collaborate but are often independent beyond assuring health and safety standards. Electrical resources are often privately or cooperatively held. Urban and tribal services are typically owned and facilitated by local entities. While these local and private resources are often involved in response and mitigation, this plan focuses on state resources. While not attached, local and tribal hazard mitigation plans are considered appendices to this plan, and more information about these local resources can be found in these plans.

2.2.4 Current and Future Land Use

Most of North Dakota's land area is dedicated to cultivated cropland, especially in the Red River Valley and North Central areas of the state, as shown in **Figure 2.112**. Cultivated crop land covers approximately 36,609 square miles followed by grasslands and herbaceous areas which cover approximately 15,729 square miles. The third most common land use is pasture and hay, which cover approximately 4,431 square miles. Forest cover exists in the Badlands in the west and in the Turtle Mountains in the north central areas. Deciduous, evergreen, and mixed forests combined cover approximately 1,141 square miles. Urbanized areas, referred to as 'developed high intensity' in the map below, are limited to major cities and cover only 50 square miles. Demographic trends such as population projections suggest that changes before the next plan update are likely to include increased development in urbanized areas, especially in cities in Western North Dakota.

Figure 2.112 North Dakota Land Cover



Source: ESRI, 2019

2.3 Conclusion

When considering hazard mitigation actions, North Dakota must (should) consider both immediate needs and the changing needs we have for preparedness, response, recovery, and protection of critical infrastructure. North Dakota's extreme weather and climate variability have been with us throughout our historical past and will not only continue but may very well increase in their extremes. Meanwhile, populations, demographics and economies are also becoming more variable.. Among the trends to consider are the following:

- While the Red River Valley continues to be primarily agrarian, the cities in the region are growing, which can put strains on existing critical infrastructure and resources. In areas like Fargo, West Fargo and Grand Forks, growth should be managed and evaluated to assure that it matches the needs of these growing communities and does not exacerbate hazardous conditions, such as flooding. Growing into areas that were formerly farmland near cities and in oil-rich areas will increase human-wildland interaction, including exposure to wildland fire and wildlife.
- In rural areas of North Dakota, population losses create new hazards related to abandoned buildings which can be unwatched and a tempting site for mischief. Rural North Dakota communities are often reliant on volunteer fire departments that have a smaller, aging pool of possible volunteers, and a decreasing tax base, which may create an increasing reliance on mutual aid from other communities and the state.
- Throughout much of the state there is a need for increased housing. In western North Dakota, a now-stabilized workforce is increasingly calling North Dakota home. The increasing number of families as permanent residents means an increasing need for affordable housing and services to meet the needs of this growing area. Services such as medical care and transportation connections may be lagging growth. In these areas, much like in urban areas, new development brings people in contact with wildlands and wildlife and development should be monitored to assure that it doesn't exacerbate risk from hazards such as flooding and landslides. Throughout the state there is a need for affordable housing, especially as housing costs rise quickly as compared to income. This can create an increase in house-burdened households who lack the financial capacity to bounce back from a disaster, that may lack the resources to evacuate, increasing the sheltering needs for communities across the state. As home ownership rates have fallen, more residents will be reliant on landlords to restore damaged properties.
- North Dakota is becoming increasingly diverse, and diversity means that the need to create a safe environment and protective laws increases as well. Immigrants may need language interpretation services and assistance in altering lifestyles to react safely toward hazards that they may have not experienced before, such as extreme heat and cold. Seasonal workers may need messaging about how to prepare their cars and alter their walking patterns to stay safe in cold or icy weather. Diversity is growing quickly in western North Dakota, where responders and leaders may be inexperienced in considering how to best communicate with and address the needs of new residents.
- In some areas of the state, housing fragility can put residents at higher risk for wind and storm damage North Dakota has many communities that have a substantial number of people living in mobile homes or other temporary housing that lacks foundation and thus may put its occupants

at a higher risk of danger from winds and flooding. The adoption and enforcement of statewide building codes should be considered.

- Smaller communities with higher-than-average rates of poverty may have limited resources contributing to higher social vulnerability. Addressing the needs of residents may take more resources per capita under these conditions of limited resources, making these communities more likely to reach out to the state for assistance. Vulnerable communities may have a range of needs and considerations beyond regular response. They may need language resources and legal assurances that the state must be ready to provide when called on for assistance.
- Homelessness is growing in the state and increased shelter capacity may be necessary to address this population since they are especially at risk from weather extremes.
- North Dakota has a diverse economy. Economic drivers may also come with potentially negative byproducts such as fertilizer, pesticides and their components in agriculture, and the energy industry. These materials may put workers and communities at risk for exposure to hazardous chemicals. North Dakota has taken legislative actions to assure that these industries are limiting their risk to the public including reporting requirements, efficiency incentives and road improvements. These actions should be continued to minimize risk from hazards.
- Communities reliant on agricultural income may have substantial financial consequences from disasters that impact livestock and crops. Plant and animal infectious diseases, drought, flooding, severe winter storms, etc., can impact revenue in the long- and short-term both at the household and at the community level.
- As the oil industry expands into new areas, new risks emerge. Going into undeveloped areas means that the transportation network and responders are stretched further, and marginal undeveloped lands are typically still undeveloped because of their hazard risk to flooding and landslides or other hazards., or due to their use for other purposes such as agriculture or recreation. Creating transportation and response capabilities to match development will be an ongoing challenge, especially in Western North Dakota.
- Transportation improvements have led to an increase in safety, but a growing population and economy and changing climate conditions that could adversely impact infrastructure will continue to make this a pressing need.

North Dakota has areas in the state that lack needed services, including transit, health care, and other essential necessities. Keeping a healthy and connected workforce is not only good for the individual, but good for recruitment of new employers and society. The lack of medical care can lead to unnecessary delays in needed health services or household decisions to delay treatment. The need for improved health services is most prevalent in areas where hazardous employment and population growth is increasing most quickly.

3 North Dakota Extreme Climate Variability and Potential Climate Change

North Dakota, and by extension its communities, has a rather dynamic historical climate profile, exhibiting a high degree of variability with some rather pronounced and slowly but steadily increasing trends in temperature and precipitation.

Considering current global climate modeling processes and barring any near-term dramatic and/or catastrophic changes in the Earth's physical geography, geology, or its solar-terrestrial alignment, the State can expect the same geophysical forces to be at play throughout the next few centuries as were in play over the past few centuries. Such forces drive the large-scale atmospheric and oceanic circulations which give rise to different airmass types and their movements, which in turn determine North Dakota's overall climate characteristics and its weather systems.

If anything, climate scientists agree that North Dakota's future climate promises to be as or more dynamic in nature than our recent past (Derner et al., 2017). This includes a range of possible scenarios for any future season or year that could be either hotter or colder, and either wetter or drier than any current North Dakota resident has ever experienced.

Climate Model Results

Across North Dakota:

1. Annual average temperatures are expected to continue warming, with wintertime minimum temperatures warming fastest and summertime daytime maximum temperatures warming more slowly.

Within this overall warming, expect extreme seasonal and annual variability to persist.

2. Annual average precipitation is likely to continue increasing, with winter precipitation increasing most rapidly and winter's shoulder seasons of late fall and early spring showing moderate increases. Summertime precipitation is expected to increase the least.

In all seasons expect an increase in the occurrence of more intense rainfall (or snowfall), with extreme seasonal and annual variability to persist. *(Frankson, 2022)*

3.1 Extreme Climate Variability

Climate variability in North Dakota means that all areas of the state have a high degree of day-to-day, week-to-week, month-to-month, season-to-season, year-to-year, and multi-decadal variability in both temperature and precipitation.

It is quite normal in North Dakota, the Northern Great Plains in general, and in each of the state's tribal and local jurisdictions, to have short-to-long periods of hotter or colder temperatures and periods of drier or wetter conditions in any mix and in any season of the year (Gust, 2015; Fisichelli et al., 2016). In recent years and in decades past, heavy spring flooding has often been followed by periods of drought, and drought often gives way to heavy rains and flooding. Such extreme weather events are considered by environmental scientists and public health officials to be an expression of climate variability (Ebi et

al., 2021) rather than climate change. Extreme climate variability, and the associated extreme weather events expressed by it, has been a perennial challenge to the effective design, construction, and maintenance of statewide infrastructure and the stability, protection, and management of human, natural, material, and economic resources located within the state.

Cascading or compounding events and impacts are those that are exacerbated by either sequential or coincidental factors, either natural or anthropogenic in origin, like wildfire or an extreme heat event coincident with a drought. All drought types can cause cascading impacts in ecological environments and human communities, including those that are primarily driven by natural conditions and those that may be human-induced and/or human-modified (Crausbay et al., 2020; Ebi, 2021). Thus, the range of compound extremes that might endanger human health is potentially vast.

Authors of the Fifth National Climate Assessment (NCA5) for the Northern Great Plains (NGP) speculate that North Dakota's extreme climate variability will likely continue to be the primary influencer or signal within each of the natural hazards which directly or indirectly impact jurisdictions and peoples across the state, over days to decades long timescales (Knapp et al., 2023). The much more subtle and gradual trends of climate change over the rest of this century may act to further extend the range of such variability and may increase the frequency of such variations beyond that which has previously been documented in the historical record.

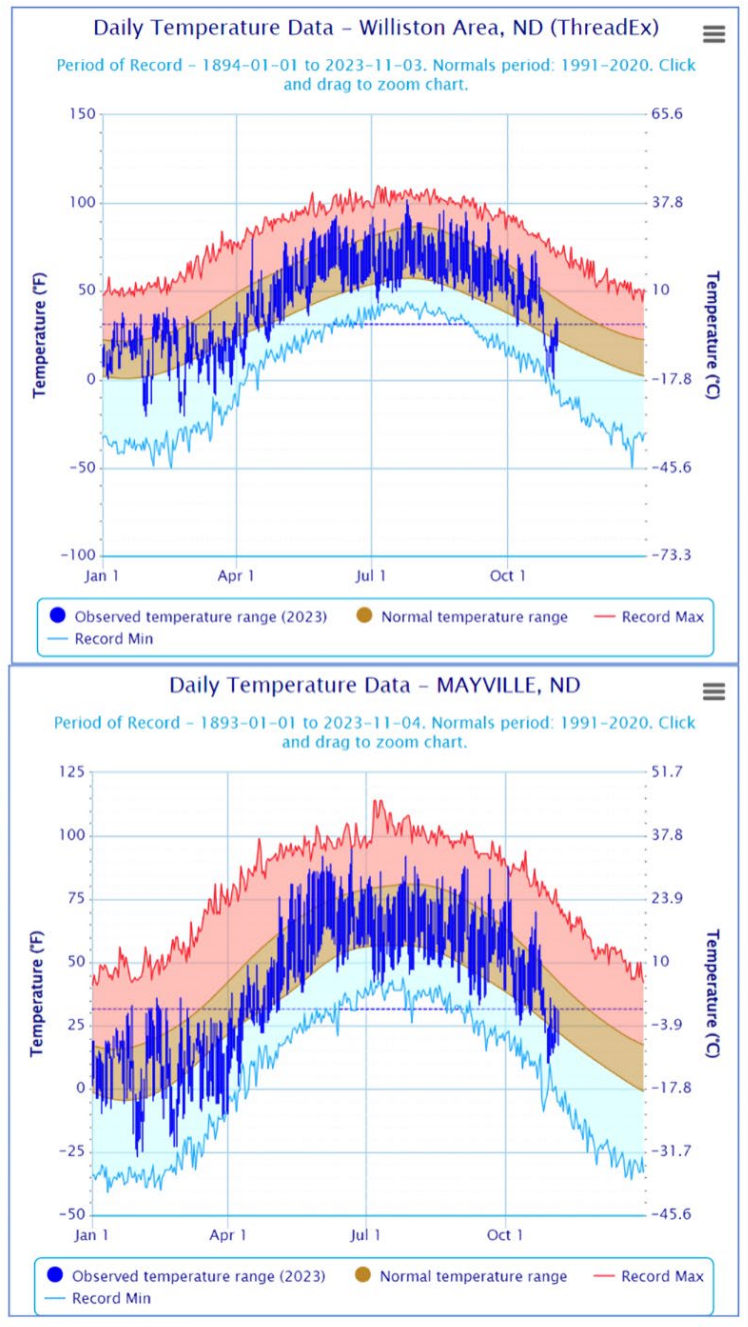
3.1.1 Extreme Daily Annual Variability in Temperature

Figure 3-1 shows the annual temperature pattern for the National Oceanic and Atmospheric Administration (NOAA) Cooperative Observation stations (NOAA-NOWData, 2023). Stations near Williston (CD-1) in northwest North Dakota, and near Mayville (CD-6) in east-central North Dakota. Williston has climate observations dating back to 1894, while Mayville observations date to 1893.

In this figure the golden band represents the range of daily temperatures, based on the 1991-2020 period. The red line indicates the daily record high temperatures for the entire period while the light blue line indicates the daily record low temperatures. The dark blue line indicates the daily maximum and minimum temperatures for the current year, from January 1 through November 3, 2023. Note that day-to-day and week-to-week temperatures are also highly variable.

At Williston, the Period-of-Record high temperature was 110°F, set on July 5, 1936, while the second highest temperature was 109°F, set on July 6, 1936. The record low temperature was -50°F, set on February 16, 1936, and again on December 23, 1983. At Mayville, the Period-of-Record high temperature was 114°F, set July 6, 1936, while the record low temperature was -41°F, set on January 11, 1912.

Figure 3-1: Daily Temperature for Williston and Mayville, ND



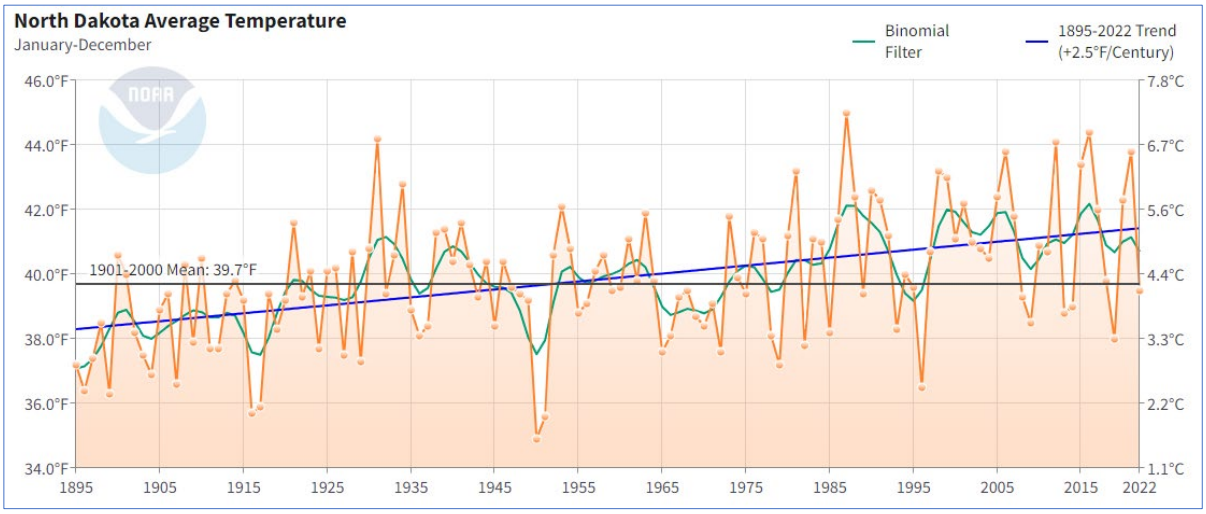
Source: NOAA, 2023

By comparison, the statewide extreme maximum of 121°F (Steele ND) was also set on July 6, 1936, while the statewide extreme minimum of -60°F (Parshall ND) was set on February 15, 1936. Numerous locations across the state still have record or near-record high or low temperatures associated with the extreme hot and cold periods that occurred throughout the 1930s Dust Bowl era.

3.1.2 Extreme Interannual/Multi-Decadal Variability in Temperature and Precipitation

Figure 3-2 shows the annual temperature pattern for North Dakota, which represents the general trend across all climate divisions from 1895 through 2022 and includes all available climate data from stations located within the nine state climate divisions. Frequent variations from warmer to colder years are common. Additionally, there are patterns of variability that occur over a period of a few years or a few decades, and a subtle but steady warming trend of around 2.5 degrees Fahrenheit per century (NCEI/CAG, 2023). Similar Climate Division and County Scale analyses are available through NOAA's Climate-at-a-Glance (CAG) website. These show that average temperatures are slightly cooler than this statewide average across the northern tier of counties and are warming at a slightly faster rate. In contrast, average temperatures are slightly warmer than this statewide average across the southern tier of counties and are warming at a slightly slower rate.

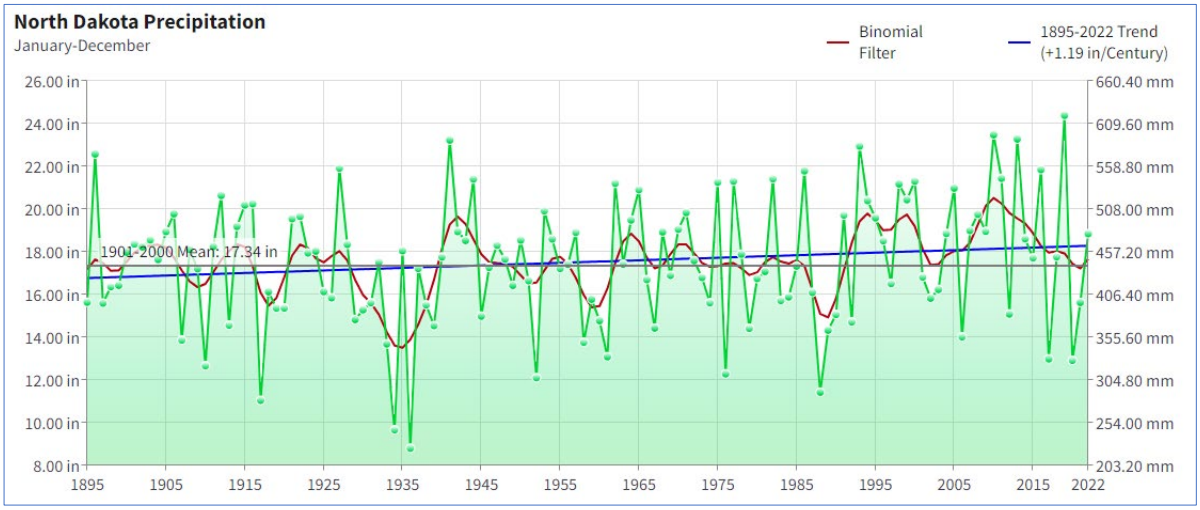
Figure 3-2: North Dakota Average Temperature



Source: NOAA, 2023

Figure 3-3 shows the annual precipitation pattern for North Dakota, which represents the general trend across all climate divisions from 1885 through 2022 and includes all available climate data from stations located within the nine state climate divisions. Again, there is frequent variability from much drier to much wetter years, with patterns of variability that occur over a period of a few years or a few decades, and the subtle but steady trend of increasing precipitation of around 1.19 inches per century (NCEI/CAG, 2023). Similar Climate Division and County Scale analyses are available through NOAA's Climate-at-a-Glance website. In general, eastern counties are somewhat wetter, overall, and are seeing a slightly faster rate of increase in precipitation while western counties are somewhat drier overall and are seeing a slightly slower rate of increase.

Figure 3-3: North Dakota Annual Precipitation



Source: NCEI, 2023

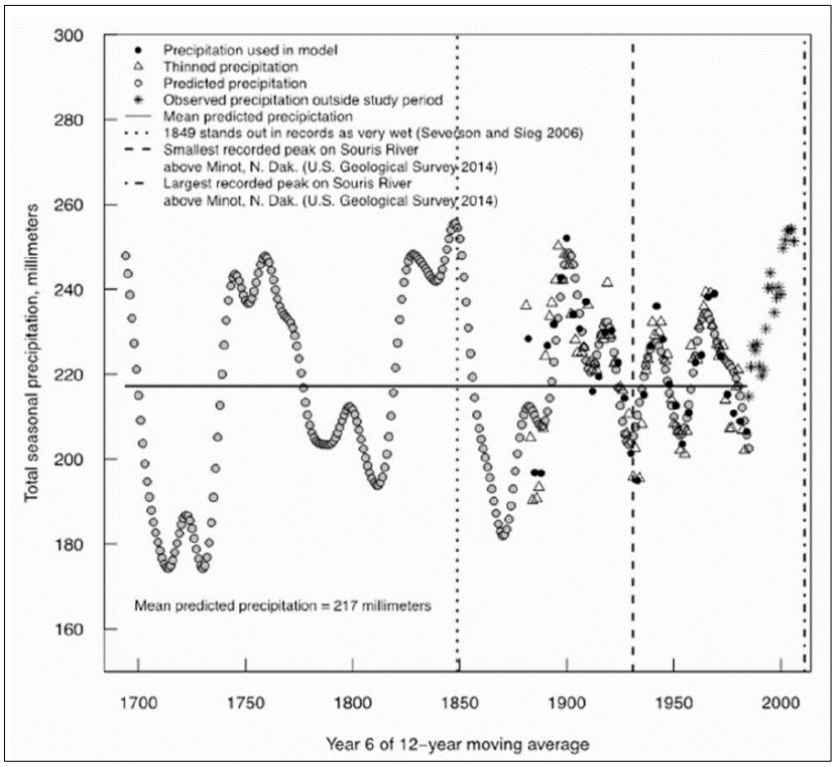
3.1.3 Multi-Decadal Signals and Trends

The pattern of steadily increasing temperature and precipitation over the recent historical period, with records extending back through 1895, may mask a more substantial pattern of multi-decadal variability that extends back at least over the past few centuries.

Figure 3-4 depicts the spring period (March-June) precipitation for an area extending across north-central and eastern North Dakota, representing the American portion of the Mouse/Souris and Red River/Devils Lake Basins, using a combination of spring precipitation records and tree ring data serving as a proxy for precipitation (Ryberg, 2015). The tree ring (precipitation proxy) records suggest an underlying 100-year cycle, with embedded shorter cycles, while the more recent and direct precipitation records indicate the presence of a higher frequency and lower amplitude pattern.

Such records indicate strong variability in late winter/spring precipitation patterns over the past several hundred years, with multiple periods likely as wet as the early 2000s and multiple periods likely drier than the 1930s (Fisichelli, 2016). Even so, the cause of these multi-decadal variability signals is not yet well understood. Climate trends in the Northern Great Plains are continually being explored, with new findings providing insights to climate specialists and planners.

Figure 3-4: Spring Precipitation in North-Central and Eastern North Dakota

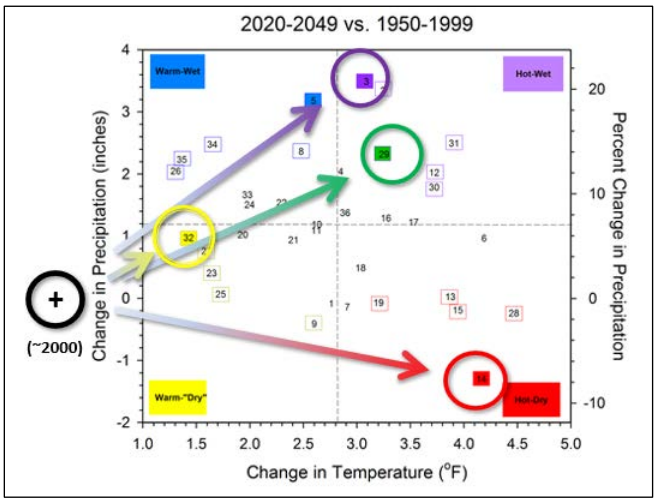


Source: Ryberg, 2015

3.2 Potential Climate Change

Figure 3-5 shows a scatterplot of 36 climate model projections extracted from the Computer Model Intercomparison Project phase 3 (CMIP3) multi-model dataset and used as part of a Climate Change Scenario Workshop held in Bismarck in November of 2015 (Gust, 2015). The original grid size of each projection was quite large, covering much of the state. For the workshop, projections were downscaled to a roughly township-sized area centered on the Knife River Indian Villages National Historical Site, situated along the west bank of the Missouri River north of Stanton (Fisichelli, 2016; Brekke et al., 2013). While downscaled to a specific location, these graphics still reflect projected conditions across a broader reference area.

Figure 3-5: Climate Change Scenario Scatterplots



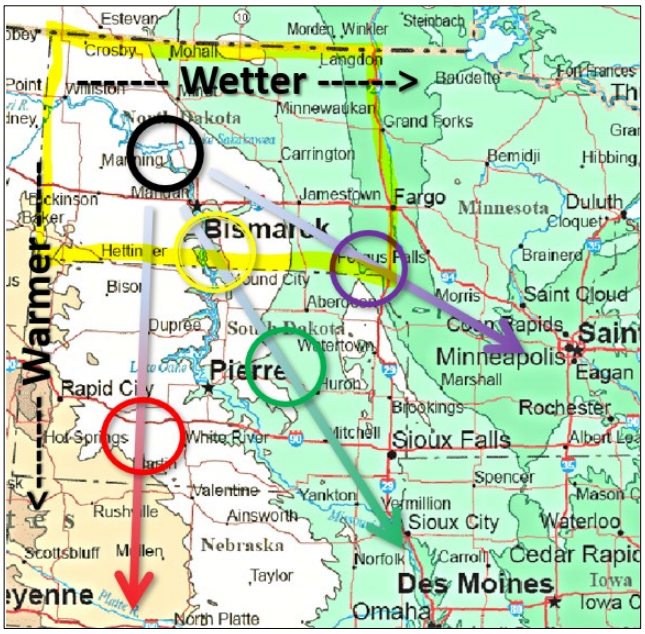
Source: Gust, 2015

The four projections highlighted in **Figure 3-5** were selected for workshop review to best illustrate the plausible range of future climate variables, to aid those engaged in planning for an uncertain climate future (Fisichelli, 2016). They reflect future years that could be much hotter and drier than average, like 2012, or 2017-2018, versus those having a mild yet snowy winter, like 2022-23, or a hot and wet summer like 2011. Including one projection (yellow) that best reflected the current, more subtle rate of change.

Warmer and potentially wetter is the projected climate change pattern for ND from these models. All 36 CMIP3 model projections in **Figure 3-5** indicated a potentially warmer future. Most of the projections indicated a potentially wetter future; roughly a quarter of the projections resulted in annual precipitation near or somewhat less than current amounts.

Figure 3-6 displays the four scenarios identified in **Figure 3-5** mapped to a location with a current climate system that is like the selected future climate (Gust, 2015; NCEI/CAG, 2023). This could be the equivalent of having the Knife River Historical Site (KRHS: black circle) somehow slowly drifting to the south (warmer and drier) or southeast (warmer and wetter) over time.

Figure 3-6: Climate Change Scenarios Mapped



Source: Gust, 2015

The direction of these projected trends is consistent with the current trends that were identified earlier. However, the magnitude of the mean of all 36 CMIP3 projections indicated a rate of change in future temperatures and precipitation at more than triple the current observed rate (NCEI/CAG, 2023). From the year 2000, when these CMIP3 simulations began, through 2022, the average pace of climate change at the KRHS has shifted only about halfway towards that of last-century Bismarck, or less than a third the rate of the yellow (slowest overall) warming scenario.

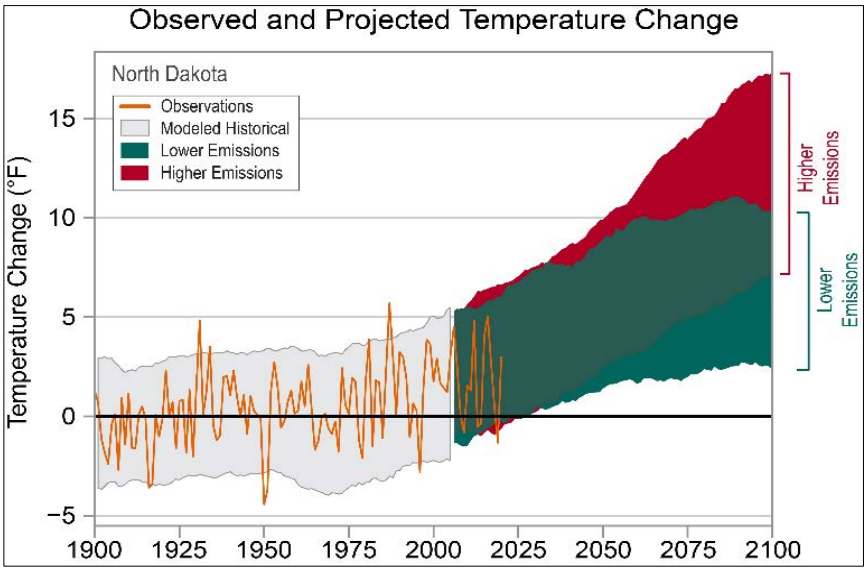
On a note of caution, analyses of the reliability of the various CMIP3 model projections for the period 2000 through 2020, and the more recent CMIP5 (2006-2020) and CMIP6 (2015-2020) projections, have shown that average projections from all three sources tend to overestimate warming of the central U.S. through central Canada, with CMIP3 and CMIP5 showing the greatest overestimation (Carvallo et al., 2022; Martell et al., 2022). Improvements noted within the more recent CMIP6 projections are largely attributable to overall improvements in model resolution and parameterization schemes.

As discussed in Section 3.1.2, temperatures across North Dakota, the Northern Great Plains Region, and much of the globe have been increasing at a subtle but steady rate throughout the 20th Century and the beginning of the 21st Century. National and global rates of increase are similar at roughly 1.60 degrees Fahrenheit (0.89 degrees Celsius) per century (NCEI/CAG, 2023). However, northern latitudes in general, and particularly North Dakota and the Northern Great Plains, are seeing markedly higher rates of change. At 2.5°F (1.39°C) per century, North Dakota's statewide average rate of annual temperature

increase is one of the fastest (tied for 6th highest) in the contiguous United States and is driven primarily by warming winter temperatures -- especially by warming wintertime low temperatures.

The 2022 North Dakota State Climate Summary reports that the statewide average annual temperature has increased by over 2.6°F in the past 122 years (since 1901). Projections indicate the potential for an additional 1 to 9 degrees Fahrenheit (0.6 to 5.0 degrees Celsius) increase above the current 1991-2020 average through mid-century (Frankson, 2022). This amounts to a projected 2.5 to 10.5 degrees Fahrenheit (1.4 to 5.8 degrees Celsius) increase above the 1901-1960 average, as indicated in **Figure 3-7**.

Figure 3-7: Observed and Projected Temperature Change Across North Dakota



Source: NCEI, 2022

Observed data are plotted as a time series for the years 1900-2020. Shading indicates the range of annual temperatures from CMIP5 model projections for both the historical (1901-2005) and future (2006-2100) periods (Frankson, 2022). Projected changes are shown for two possible futures: one in which global greenhouse gas emissions continue to increase at a high rate (RCP8.5) or a mid-range rate (RCP4.5).

Like the CMIP3 projections in **Figure 3-5**, the trend through 2020 for the CMIP5 projections has so far tracked at a lower overall rate. And Carvalho (2022) found that the most recent and finest resolution CMIP6 projections show the least amount of overestimation, over the short verification timeframe which has elapsed since those model runs were made available (2015-2020). Carvahlo (2022, p. 6) notes that "inferences about warming at longer timescales (using CMIP6 projections) cannot be done with confidence, since the model's internal variability can play a relevant role on timescales of 20 years and less". Climate model skill is expected to continue with incremental improvement as model components and their resolution improve in coming years.

3.3 Extreme Weather Becoming More Extreme

Regardless of the projected timescale, recent climate change trends have shown, and future projections suggest that North Dakota can expect continued gradual warming in all seasons, with the greatest warming expected in the winter season.

Expect increased rain/snow rates. Globally, warmer conditions will increase total atmospheric moisture, primarily due to large scale evaporation over warmer oceans, and at a faster rate than the total

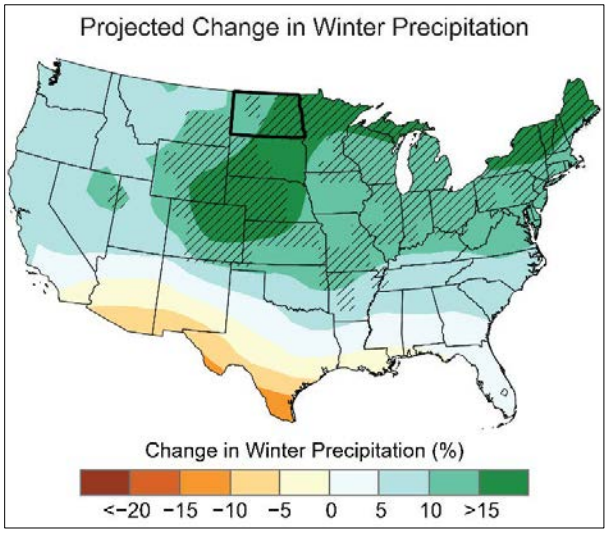
precipitation amount (Trenberth, 2003). This will inevitably lead to increases in intensity, duration, and/or frequency of precipitation events.

Expect increased instances of drought. Summer and winter storms should see increased rainfall or snowfall rates across the Northern Great Plains states (Knapp, 2023). However, warmer overall temperatures should also increase evaporative demand, especially in the warm season, which could exceed the increased precipitation and lead to increased drought. North Dakota has exhibited an increasing, though somewhat less steady trend in precipitation over the past century. Statewide, the current long-term trend has been for increasing spring and fall precipitation, with little significant increase in core summer or winter precipitation.

Expect snowier winters. Figure 3-8 is from the NOAA NCEI State Climate Summary for North Dakota (Frankson, 2022). It shows projected changes in total precipitation during the winter period, for the middle of the 21st Century as compared to the late 20th Century, and under a high emissions pathway. A statistically significant change is considered likely for the state, with a projected increase of 10 to 15 percent by 2050. Precipitation during the winter shoulder seasons, late fall and early spring, is also expected to increase.

Expect more spring flooding. The CMIP5 model projections, which have been used extensively for this analysis, indicate that future precipitation is likely to increase, with the greatest expected increase over North Dakota to occur in the winter and adjacent portions of the spring and fall (Swain & Hayhoe, 2015). Given the expected high degree of inter-seasonal and interannual variability, this could lead to longer and stronger droughts interspersed with snowier winters and more frequent and more intense spring flooding.

Figure 3-8: Projected Change in Winter Precipitation for the Middle of the 21st Century



Source: NCEI, 2022

Expect slightly longer drought periods. Statewide precipitation is often as or more variable than temperature. An excessively warm and/or dry period in spring or summer can have a remarkably different impact on ecosystems or economies than warm and/or dry conditions in fall or winter. Summer seasons should be warmer, especially after mid-century, with similar or slightly more precipitation than present. However, the projected additional precipitation is less certain than the projected rise in temperatures and, depending on when/if it occurs, any additional precipitation may or may not be sufficient to offset higher evapotranspiration rates. The CMIP5 projections and CLIMDEX scenario simulations show a mean increase of 1 or fewer days per year in the length of the longest dry spell of any given year (Sun et al., 2015). Though this suggests only slightly longer drought periods, there is an increased risk that a drought which carries over from fall to the following winter and spring periods could also persist into and through the following summer.

3.4 Future Climate, Hazards, and Potential Impacts

A broader and longer view of climate is essential. North Dakota's extreme climate variability, its historic and projected propensity for rapid fluctuations between extremes in temperature and precipitation, creates rapid fluctuations between various hazardous conditions, and demands that state and local planners and managers approach future climate considerations with both a broader and a longer view. *Broader* in the sense that short-term climate variability evident in neighboring counties and adjacent states or provinces should be considered as possible in any ND county in any future year. *Longer*, in that extreme conditions which may have occurred over a given area within the state over the recent or distant past will likely be repeated and quite possibly exceeded through the remainder of this century.

A highly variable and/or changing climate will affect more than just temperatures and precipitation levels. An increase in the frequency and severity of extreme heat events and severe summer weather will adversely affect public health, water resources, and the production of agriculture (both crops and livestock). A changing climate will increase the incidence of warm wintertime temperatures while simultaneously increasing the frequency and severity of extreme cold and severe winter weather episodes, adversely impacting public health, water resources, and essential services. On a more positive note, the average length of the growing season could increase by up to 12 days per century in North Dakota (Gust, 2015; Fisichelli, 2016). Even so, concern remains as to whether critically important spring rains will accompany the projected earlier warmth, and whether damaging late spring frosts will be held at bay.

Here is an abbreviated list of the potential impacts associated with each of the 15 natural or human-caused hazards detailed in later portions of this plan. Please refer to the specific Hazard Profiles in Chapter 4 of this plan for a more complete discussion of potential Future Climate Impacts and related Adaptation or Mitigation strategies, along with references.

1. **Flood Hazard.** Future climate conditions are expected to produce increased precipitation across North Dakota, with winter and early spring precipitation expected to see the greatest increase, along with an increased risk of rainfall occurring during the traditional spring snowmelt period. In addition to increased precipitation during the cool/cold season, the number of days with strong thunderstorms and heavy rainfall is expected to increase by mid-century, especially in the eastern half of the state. Increased rainfall rates typically result in increased runoff rates and an increase in flash flooding, overland flooding, and/or riverine flooding in any season. However, rain occurring when the ground is frozen produces even more and faster runoff and is most likely to exacerbate the flood threat.

2. **Fire (Wildland/Urban) Hazard.** Droughts are projected to increase in size, frequency, and duration. The expected increases in temperatures and frequency of droughts translate into an increase in the size, frequency, and intensity of both wildland and urban fires, with an added risk due to increasing development in the Wildland-Urban Interface. Also, water supplies used for fire suppression may become compromised during drought conditions. Total acres burned have markedly increased over the past 10-15 years, while rural fire departments across ND are largely staffed by volunteers. As the frequency and intensity of wildfires are projected to increase, volunteer fire departments are projected to lose personnel strength due to general

rural population declines and/or staff retirements. These trends will likely stress unit resources and increase fire response times.

3. **Drought Hazard.** Through the end of this century, expect larger and more intense droughts, with increasing frequency and/or longer duration of drought periods in North Dakota. Potential impacts include more episodes of extreme heat/heat index with increased human, animal, and crop stress; more rapid onset of drought conditions or flash drought; more drought related (both wind and rapid rainfall runoff) erosion, riverbank destabilization, etc.; reductions in overall agricultural economy. Drought impacts on vulnerable water users, such as the agriculture industry and municipal systems, will likely be exacerbated.

4. **Cyberattack Hazard.** There is no known direct connection between cyberattacks and future climate conditions, though attackers may take advantage of inclement weather periods and other social, infrastructure, or economic stressors to mask or otherwise facilitate their attacks.

5. **Severe Winter Weather.** Through the end of this century in North Dakota, expect larger, more frequent, and more intense periods of heavy wet snow, mixed precipitation or ice storms, and freezing drizzle or mist, along with somewhat warmer temperatures. Potential Impacts include a likely increase in winter season precipitation, overall, with more periods of heavy snowfall and/or freezing rain/ice events. Warmer winter season temperatures will support a higher incidence of mixed precipitation (sleet), freezing rain, or ice storms, which will likely impact transportation, power transmission, roof loading, critical facilities, and infrastructure, along with general health and safety. Human health impacts include an increased incidence of heart, back, and/or muscle related injuries from shoveling snow or falling on ice.

6. **Severe Summer Weather.** Through the end of this century in North Dakota, expect more frequent, larger, and longer duration storms with an increase in intense rain and flooding, and an increase in large hail. Potential Impacts include an expected increase (high confidence) in heavy precipitation events overall, higher in northcentral and northeast North Dakota and somewhat lesser in southwest North Dakota, with a likely increase in areal and/or flash flooding but less certain impacts on summertime riverine flooding. Hail size, frequency of large hail, and length of the hail season should increase (medium confidence) with a commensurate increase in the frequency and intensity of lightning and damaging downburst winds which are tied to hail production. Expected increases in temperature are likely to lead to an increase in days with a high Heat Index and the potential for lost work hours during such periods.

7. **Infectious Disease and Pest Infestation.** North Dakota should expect larger, more frequent, and more intense outbreaks of certain infectious diseases and pests, though some human and animal diseases may decrease in occurrence. As a result of slightly warmer and longer summers, more pests and invasive weeds will be able to thrive and spread, contributing to increases in insect populations and certain vector-borne diseases such as West Nile disease. Somewhat shorter and less cold winter seasons could also lead to decreased incidents of certain infectious diseases among both human and animal populations during this period, depending on how and where population growth (or withdrawal) and development occur.

8. **Dam Failure Hazard.** The expected increase in size, intensity, and frequency of both drought and heavy precipitation episodes, or an increased frequency in change between drought and flood intervals may put more dams at risk of scenarios that exceed the original design criteria of each respective dam. Aging dams are most at risk for this expected impact.

9. **Space Weather.** Through the end of this century in North Dakota, future climate conditions are not expected to directly impact the occurrence of space weather events, though indirectly the extent, intensity, and frequency of hazard related impacts could potentially be increased. Indirectly, if extreme climate variability and/or climate change begin to stress area power grids, satellite and terrestrial communications infrastructure, and other critical facilities then there is a potential for increased (compounding) impacts from any concurrent Space Weather Hazard phenomena in these and related areas.

10. **Criminal Attack Hazard.** There is no known direct connection between future climate conditions and the location, extent, intensity, or duration of specific criminal threats, though indirect connections are possible. For instance, future climate would not necessarily promote or prevent a specific threat, while a specific weather episode may help to delay or advance such actions. And Increased heat stress, along with increased summer and winter storms, wildfires, floods, transportation incidents, etc. could increase social unrest, which could encourage increased criminal threats.

11. **Hazardous Material Release.** Although this hazard is largely human-caused, future climate conditions may cause both direct and indirect impacts. Warmer temperatures may directly result in the expansion of gases, increases in biologic agents, or other such actions that could put hazardous material storage containers, transporters, applicators (i.e., anhydrous ammonia), or facilities at an increased risk. Increased summer and winter storms, wildfires, floods, transportation incidents, etc. could indirectly put hazardous material containers, transports, applicators (i.e., anhydrous ammonia), or facilities at an increased risk.

12. **Geologic Hazard.** Through the end of this century in North Dakota, expect more frequent, larger, and more intense geologic hazards, such as landslides, riverbank collapse, and sink holes. Both Drought and Heavy Precipitation events are projected to occur more frequently, which is expected to contribute to an increased frequency of landslides where steep slopes are present, or to riverbank collapse where undercutting due to subsoil (groundwater) flow and/or antecedent flooding is possible. Both extremes also increase the potential for wind and water erosion. Increased development pressure and the impacts of future climate conditions may increase the risk to a variety of state infrastructure and assets if constructed or situated in areas prone to geologic hazards.

13. **Terrorist or Nation-State Attack Hazard.** There is no known direct connection between future climate conditions and the location, extent, intensity, or duration of specific adversarial threats, though indirect connections are possible. For instance, future climate would not necessarily promote or prevent a specific threat, while a specific weather episode may help to delay or advance such actions. And Increased heat stress, along with increased summer and winter storms, wildfires, floods, transportation incidents, etc. could increase social unrest, which could encourage increased adversarial threats.

14. **Civil Disturbance.** There is no known direct connection between future climate conditions and civil disturbance, though some research links the effects of climate change anxiety to an increasing intensity of civil disturbance in a variety of developing and developed countries. And research shows that increased heat stress, along with increased summer and winter storms, wildfires, floods, transportation incidents, etc. could increase social unrest, which could encourage general civil unrest. Likewise, there is an increased risk of civil disturbances targeted toward the oil and gas industry in North Dakota from growing public concern over potential impacts of climate change.

15. **Transportation Incident.** Through the end of this century in North Dakota, expect more frequent, larger, more intense, and/or longer duration droughts, floods, summer storms, winter storms, and attendant impacts - most of which are expected to adversely impact corresponding transportation corridors and lead to more frequent transportation incidents. Projected changes in these natural hazards will indirectly impact transportation incidents, primarily through a potential increase in hazardous road, rail, and runway conditions. These conditions may strain existing emergency response services and require increased sheltering capacities.

Please refer to each of the 15 specific Hazard Profiles in Section 4 of this plan for a more complete discussion of potential Future Climate Impacts and related Adaptation or Mitigation strategies, along with references.

4 Threat and Hazard Identification and Risk Assessment (THIRA)

4.0.1 Threat and Hazard Identification

4.0.1.1 Overview

The state of North Dakota faces threats and hazards of a wide variety. A threat is "a natural, technological, or human-caused occurrence, individual, entity, or action that has or indicates the potential to harm life, information, operations, the environment, and/or property," (FEMA, 2023). A hazard is "something that is potentially dangerous or harmful, often the root cause of an unwanted outcome." For the purpose of this plan, the SHMT identified threats and hazards after considering past and possible future occurrences, disaster declarations, and input from committee members that spanned state government, private and public sectors, as well as data gathered for local and tribal hazard mitigation plans. Similar hazards may be grouped together. The SHMT met on June 21, 2023, to discuss the current hazards in the plan and finalized the 15 hazards described and assessed in this plan. This plan update separates criminal attacks as its own hazard separate from terrorism and nation-state attacks due to its higher likelihood of occurrence across the state. These threats and hazards are identified in **Figure 4.0-1**.

Figure 4.0-1: Threat and Hazard Identification

Hazard or Threat	Events Included	Identification Method
Civil Disturbance		• Review of Previous Enhanced Mitigation MAOP THIRA • Review of prior events in local media
Criminal Attack*		• Review of Previous Enhanced Mitigation MAOP THIRA • Review of prior events in local media
Cyberattack		• Review of Previous Enhanced Mitigation MAOP THIRA • Review of Prior Events, Federal Planning and Standards, State Countermeasures and Education
Dam Failure		• Review of Previous Enhanced Mitigation MAOP THIRA • Review of Local Emergency Plans • Review of USACE National Inventory of Dams (NID)
Drought	Drought	• Review of NCEI Storm Events Database • Review of NRI data • Review of USDA Risk Management Agency (RMA) data
	Snow Drought	• Review of USDA Secretarial Disaster Declarations
Flood	Riverine	• Review of NOAA's National Centers for Environmental Information (NCEI) Storm Events Database • Review of FEMA's National Risk Index (NRI) • Review of Base Level Engineering data from North Dakota Risk Assessment Map Service (NDRAM)

Hazard or Threat	Events Included	Identification Method
	Flash Flooding	• Review of NCEI Storm Events Database • Review of North Dakota Disaster Declarations
	Closed-Basin Flooding	• Review of Previous Enhanced Mitigation MAOP THIRA
	Levee Failure	• Review of NCEI Storm Events Database event narratives field • Review of USACE National Levee Database (NLD)
	Ice Jams	• Review of NCEI Storm Events Database event narratives field
Geologic Hazards	Landslides	• Review of landslide data in ND GIS Hub
	Environmental Minerals	• Review of Previous Enhanced Mitigation MAOP THIRA
	Earthquakes Abandoned Mine Lands	• Review of Previous Enhanced Mitigation MAOP THIRA • Review of abandoned mine location data from ND GIS Hub
	Volcanic Hazards	• Review of Previous Enhanced Mitigation MAOP THIRA
	Expansive/Unstable Soils	• Review of Previous Enhanced Mitigation MAOP THIRA
	Environmental Minerals	• Review of Previous Enhanced Mitigation MAOP THIRA
	Meteorite Falls	• Review of Previous Enhanced Mitigation MAOP THIRA
	Volcanic Hazards	• Review of Previous Enhanced Mitigation MAOP THIRA
Hazardous Material Release		• Review of Previous Enhanced Mitigation MAOP THIRA • Review of critical infrastructure vulnerability
Infectious Diseases and Pest Infestations	Human	• Review of North Dakota Disaster Declarations • Review of Previous Enhanced Mitigation MAOP THIRA
	Animal	• Review of previous occurrences in local media • Review of Previous Enhanced Mitigation MAOP THIRA
	Plant	• USDA Risk Management Agency Crop Losses, Previous Plan THIRA
	Pest Infestations	• Prior events, Previous Plan THIRA
Severe Summer Weather	Downbursts	• Review of NCEI Storm Events Database • Review of prior events in local media • Review of American Meteorological Society (AMS) information
	Extreme Heat	• Review of North Dakota Disaster Declarations • Review of NCEI Storm Events Database • Review of National Weather Service (NWS) information • Review of NRI data
	Hail	• Review of Previous Enhanced Mitigation MAOP THIRA Previous Plan THIRA, NCEI, NRI, Media
	Lightning	• Review of NCEI Storm Events Database • Review of NRI data
	High Wind	• Review of NCEI Storm Events Database • Review of NRI data
	Tornado	• Review of NCEI Storm Events Database • Review of NRI data • Review of previous occurrences in local media
	Blizzards	• Review of NCEI Storm Events Database

Hazard or Threat	Events Included	Identification Method
Severe Winter Weather		• Review of NRI data
	Extreme Cold/Wind Chill	• Review of NCEI Storm Events Database • Review of NRI data
	Heavy Snow	• Review of NCEI Storm Events Database • Review of NRI data • Review of Previous Enhanced Mitigation MAOP THIRA
	Ice Storms	• Review of NCEI Storm Events Database • Review of NRI data
	Freeze/Frost	• Review of NCEI Storm Events Database • Review of NRI data • Review of prior events in local media
Space Weather		• Review of Previous Enhanced Mitigation MAOP THIRA • Review of Space Weather Prediction Center (SWPC) information
Terrorist or Nation-State Attacks**		• Review of previous national events
Transportation Incident	Motor Vehicle	• Review of previous occurrences in North Dakota Department of Transportation (NDDOT) data
	Railroad	• Review of Previous Enhanced Mitigation MAOP THIRA
	Aviation	• Review of previous occurrences in local media and National Transportation Safety Board (NTSB)
Wildfire/ Urban Fire	Wildland Fire	• Review of Previous Enhanced Mitigation MAOP THIRA • Review of North Dakota Emergency Reporting (ER) data • Review of NRI data
	Urban Fire	• Review of prior events from local media sources • Review of National Fire Incident Reporting System (NFIRS) data

*Previously grouped with Terrorist or Nation-State Attacks

**Previously grouped with Criminal Attacks

There were also hazards that were excluded from the plan. Some common hazards were not considered and evaluated for the plan because they have limited relevance to North Dakota due to its location or geology. Others were identified in local plans but were considered in the state plan as a cascading impact or sub-hazard of another hazard. An overview of these hazards is shown in **Figure 4.0-2**.

Figure 4.0-2: Hazards Not Included or Minimally Included

Hazard	Notes
Avalanche	Avalanches require slopes that generally do not exist in North Dakota. The state is not covered by the National Avalanche Center and has no history of declared avalanche disasters.
Climate Change	Climate change is addressed as a condition that impacts most hazards, but not as a separate hazard in its own.
Coastal Erosion	North Dakota does not have coastlines.
Coastal Storm	North Dakota does not have coastlines.
Hurricane	North Dakota is not in an area that is likely to be impacted by hurricanes, and any impact is likely to be experienced as a severe summer storm.
Public Utility Failure	Utility failure is viewed as a consequence of other hazards and not as a hazard in and of itself.
Shortage/Outage of Critical Materials	Lack of critical materials is viewed as a consequence of other hazards and not as a hazard in and of itself.
Tsunami	North Dakota does not have a coastline.
Volcano	North Dakota has no identified volcanoes in its borders, and the impact of an external volcano is discussed in geologic hazards. There is no history of declared disasters in the state related to volcanic activity.
Windstorm	Windstorms are identified as severe summer and severe winter weather, but not as a hazard in and of themselves.

The hazards in this plan are discussed in the order in which they were deemed to be a priority for risk to the state. Hazards identified by the state fall under three types – natural hazards, technological hazards, and adversarial threats.

Natural hazards, as defined by FEMA are “related to weather patterns and/or physical characteristics of an area. Often natural hazards occur repeatedly in the same geographical locations” (FEMA, 2023). The natural hazards identified in this plan are Flood, Fire, Drought, Severe Winter Weather, Severe Summer Weather, Infectious Disease and Pest Infestation, Space Weather and Geologic Hazards.

Technological hazards “originate from technological or industrial accidents, infrastructure failures, or certain human activities. These hazards cause the loss of life or injury, property damage, social and economic disruption, or environmental degradation, and often come with little to no warning,” (FEMA, 2023). Technological hazards in this plan include Dam Failure, Hazardous Material Release, and Transportation Incidents.

Adversarial threats are “conventional or unconventional methods to counter the state through conflict, insurgency or guerilla warfare to coerce or intimidate,” (FEMA, 2023). Adversarial threats in this plan

include Cyberattack, Criminal Attack, Civil Disturbance and Terrorist or Nation-State Attack. Hazards are shown by their category in **Figure 4.0-3** below.

Figure 4.0-3: Hazards by Type

Natural Hazards	Technological Hazards	Adversarial Threats
Flood	**Dam Failure**	**Cyberattack**
Wildfire/Urban Fire	**Hazardous Material Release**	**Criminal Attack**
Drought	**Transportation Incident**	**Civil Disturbance**
Severe Winter Weather		**Terrorist or Nation-State Attacks**
Severe Summer Weather		
Infectious Disease and Pest Infestation		
Space Weather		
Geologic Hazards		

4.0.1.2 Summary of Data Analysis

To evaluate the risk, consequences and vulnerabilities of hazards, the plan analyzes national and state data. Historical occurrences, especially those happening since the last plan update are described in the previous occurrences section. The extent and magnitude of events and the location in the state in which they occur are described in the location and extent section. Probability considers the likelihood of the hazard occurring in the next five years and the magnitude of the likely occurrence. Warning time and duration are also discussed as some hazards are predictable and provide time for the public to prepare and take appropriate action.

4.0.1.3 Summary of Consequence and Vulnerability Analysis

The consequence and vulnerability analysis discusses the impacts from hazards and draws attention to those population groups or critical infrastructure most at risk for harm from hazards due to fragility, geography, or uneven burden. Consequence and vulnerability are considered across eight categories: 1) human loss; 2) first responders; 3) environmental, natural and cultural resources; 4) property, facilities, and infrastructure damage; 5) critical facilities, community lifelines, and state assets; 6) state economy and economic disruption; 7) delivery of service and continuity of operations; and 8) public confidence in the state's governance. These categories consider the value of human life, environment and history, the services necessary for societal function, property and economy, and uninterrupted functioning of state government.

Figure 4.0-4 summarizes the level of consequence assigned to each category for all initially identified hazards. The categories of consequence were developed from FEMA and Emergency Management Accreditation Program (EMAP) standards, and each category is discussed in detail in the hazard profiles developed for this section. Each value was obtained by assigning varying degrees of consequence to eight consequence categories for each hazard). Each category has been assigned a value (1 to 4) with the categories averaged at equal weight. Accordingly, the highest possible value for any hazard is 4.0.

Figure 4.0-4: Consequence Assessment

Hazard	Consequence Analysis Category								Consequence Factor
	Human Loss	First Responders	Environmental, Natural, and Cultural Resources	Property, Facilities, and Infrastructure Damage	Critical Facilities, Community Lifelines, and	State Economy and Economic Disruption	Delivery of Service and Continuity of Operations	Public Confidence in the State's Governance	
Natural Hazards									
Drought	1	1	4	3	3	4	3	3	2.75
Flood	3	3	3	4	4	4	3	3	3.38
Geologic Hazards	1	2	3	2	2	1	1	1	1.63
Infectious Disease and Pest Infestation	4	3	2	2	2	3	2	3	2.63
Severe Summer Weather	2	3	4	4	3	2	2	1	2.63
Severe Winter Weather	3	3	3	3	3	3	3	1	2.75
Space Weather	2	2	2	4	3	2	3	3	2.63
Wildfire/Urban Fire	3	3	4	4	3	2	3	3	3.13
Technological Hazards									
Dam Failure	3	2	3	4	3	2	1	3	2.63
Hazardous Material Release	1	3	3	2	2	2	1	3	2.13
Transportation Incident	2	2	1	1	1	1	1	1	1.25
Adversarial Threats									
Civil Disturbance	2	4	2	2	1	2	1	2	2.00
Criminal Attack	4	4	1	1	2	1	1	2	2.00
Cyberattack	1	1	1	4	3	4	4	4	2.75
Terrorist or Nation-State Attack	3	4	1	1	1	2	2	2	2.00

This section also considers historical impacts in estimating loss and considers changes into the future in examining community resilience and changing future conditions and their impact on future hazard events. Among those future conditions considered are climate change and changes in development patterns.

4.0.2 Risk Assessment

4.0.2.1 Summary of Risk Assessment Process

The risk assessment uses several measures to express the likelihood of harm from a hazard or threat across the state, the first of which is the National Risk Index (NRI). The NRI is a new tool developed by FEMA to help illustrate the relative risk in the nation to natural hazards (FEMA, 2023). The tool helps planners and emergency managers better understand relative risk in their communities. The NRI has evolved from the FEMA Region 8 Vulnerability Index developed in 2008, and the data used in this document was released in March 2023 (FEMA, 2023). As a new tool, its data does not necessarily extend as far back in history as other available datasets and is not a substitute for localized data analysis.

A Priority Risk Index (PRI) was also developed that considers the probability, impact, spatial extent, warning time and duration of each hazard and provides an index score and weight for each category. The purpose of the PRI is to categorize and prioritize all potential hazards for the state of North Dakota as high, moderate, or low risk. Probability and impact were each weighted at 30 percent, spatial extent at 20 percent and warning time and duration were each weighted at 10 percent. **Figure 4.0-5** shows the possible responses for each hazard in the risk categories.

Figure 4.0-5: Risk Categories

Probability	Impact	Spatial Extent	Warning Time	Duration
Highly Likely	Catastrophic	Large	Less than 6 Hours	Less than 6 Hours
Likely	Critical	Moderate	6 to 12 Hours	Less than 24 Hours
Possible	Limited	Small	Less than 24 Hours	Less than One Week
Unlikely	Minor	Negligible	More than 24 Hours	More than One Week

Probability is defined in the PRI as the likelihood or frequency of the hazard or adversarial attack occurring. As this is a state level plan, for many of the hazards, there is the added caveat of the hazard occurring to the extent that state resources are involved. While traffic accidents, criminal activity and even geologic and flood events may occur reliably in any given year, many of these hazards are handled by local and tribal responders or need no response and never rise to the need of notification to the state or requesting state resources. **Figure 4.0-6** shows the categories for probability defined. Those considered highly likely are nearly certain to occur in any given year, while those rated as unlikely may go without incident in the state prior to the next plan update.

4.0-6: Probability Table

Definition	Probability				
	Highly Likely	Likely	Possible	Unlikely	Weight
Likelihood or frequency of the hazard or adversarial attack occurring	4	3	2	1	0.3
	Greater than 90% annual possibility of an event occurring and causing harm requiring state resources	Between 50% and 90% annual chance of an event occurring and requiring state resources	Between 10% and 50% annual chance of an event occurring and requiring state resources	Less than a 10% annual chance of an event occurring and requiring state resources	

Impact includes the physical, social, economic, and governmental consequences from a hazard event. This includes the loss of life and injuries, and the incapacitation of critical infrastructure or community lifelines. Property damage, environmental harm, and social impacts as well as the government's ability to perform and do so with the faith of the public is also considered in ranking the impact of each hazard. Definitions of the Impact are included in **Figure 4.0-7**.

4.0-7: Impact Table

Definition	Impact				
	Catastrophic	Critical	Limited	Minor	Weight
Physical, economic, social, and governmental consequences of a hazard	4	3	2	1	0.3
	Deaths, high numbers of injuries, loss of critical infrastructure for more than a week, incapacitation of community lifelines, significant property damage and/or impacts to more than 50% of the population of an impacted area	Possible deaths, injuries, loss of critical infrastructure for less than a week, incapacitation of community lifelines, significant property damage and/or impacts for 25% of the impacted area	Minor injuries, loss of critical infrastructure for a day or persistent alterations to normal use, limited property damage	Minimal impact to critical infrastructure and community lifelines that are overcome or addressed within a day, limited property damage and life disruption	

The spatial extent of each hazard is described in **Figure 4.0-8**. Each hazard is ranked on its spatial extent based on the geographical area that experiences an impact from the event. An event that incorporates much or all of the state has a large spatial extent,

4.0-8: Spatial Extent Table

Definition	Spatial Extent				
	Large	Moderate	Small	Negligible	Weight
Size of area impacted by hazard event	4	3	2	1	0.2
	Statewide or near statewide impacts	Regional, watershed or corridor-wide impacts	Localized or sporadic impacts	Impacts limited to immediate vicinity	

while a hazard event that has impacts limited to a single property or may disperse with limited impacts has a low score.

Warning time is explained in **Figure 4.0-9**. Hazards that provide longer than a day of warning time have a lower score than those with an onset of less than six hours, giving local responders and households less time to prepare for the impacts of the hazard.

4.0-9: Warning Time

Definition	Warning Time				
	Less than 6 Hours	6 to 12 Hours	Less than 24 Hours	More than 24 Hours	Weight
Anticipated time to take preparatory actions before an event impacts an area	4	3	2	1	0.1

4.0-10: Duration

Definition	Duration				
	More than 1 week	Less than 1 week	Less than 24 Hours	Less than 6 Hours	Weight
The length of time an event occurs	4	3	2	1	0.1

Duration considers the length of time that a hazard event lasts. Floods, droughts, and disease can continue to impact an area for a very long time, while the consequences of a tornado can occur very quickly. The weight and rating for duration is shown in **Figure 4.0-10**.

The PRI was used to initiate discussion by SHMT members about risk to determine the priority of hazards identified in the state, ranking the hazards from those most likely to impact the state to those least likely to impact the state and its resources. The PRI is shown in Figure **4.0-11**.

Figure 4.0-11 summarizes the degree of risk assigned to each category for all initially identified hazards. Risk levels were assigned based on the detailed hazard profiles developed for this section. Each value was obtained by assigning varying degrees of risk to five categories for each hazard (probability, impact, spatial extent, warning time, and duration). Each degree of risk has been assigned a value (1 to 4) and an agreed upon weighting factor. To calculate the value for a given hazard, the assigned risk value for each category is multiplied by the weighting factor. The sum of all five categories equals the final PRI value, as demonstrated in the example equation below:

VALUE = [(PROBABILITY x .30) + (IMPACT x .30) + (SPATIAL EXTENT x .20) + (WARNING TIME x .10) + (DURATION x .10)]

According to the weighting scheme and point system applied, the highest possible value for any hazard is 4.0.

Figure 4.0-11: Summary of PRI Results for North Dakota

Hazard	Category/Degree of Risk					
	Probability	Impact	Spatial Extent	Warning Time	Duration	PRI Score
Natural Hazards						
Drought	Highly Likely	Critical	Large	More than 24 hours	More than 1 week	**3.4**
Flood	Highly Likely	Catastrophic	Large	More than 24 hours	More than 1 week	**3.7**
Geologic Hazards	Possible	Limited	Negligible	Less than 6 hours	Less than 6 hours	**1.9**
Infectious Disease and Pest Infestations	Highly Likely	Limited	Moderate	More than 24 hours	More than 1 week	**2.9**
Severe Summer Weather	Highly Likely	Limited	Large	Less than 6 hours	Less than 6 hours	**3.1**
Severe Winter Weather	Highly Likely	Limited	Large	6 to 12 hours	Less than 1 week	**3.2**
Space Weather	Possible	Limited	Large	Less than 24 hours	Less than 24 hours	**2.2**
Wildfire/Urban Fire	Highly Likely	Catastrophic	Small	Less than 6 hours	Less than 1 week	**3.5**
Technological Hazards						
Dam Failure	Likely	Minor	Moderate	Less than 6 hours	Less than 6 hours	**2.3**
Hazardous Material Release	Likely	Limited	Negligible	Less than 6 hours	Less than 6 hours	**2.2**
Transportation Incident	Unlikely	Minor	Negligible	Less than 6 hours	Less than 6 hours	**1.3**
Adversarial Threats						
Civil Disturbance	Unlikely	Limited	Negligible	More than 24 hours	Less than 24 hours	**1.4**
Criminal Attack	Possible	Critical	Negligible	Less than 6 hours	Less than 6 hours	**2.2**
Cyber Attack	Highly Likely	Limited	Large	Less than 6 hours	More than 1 week	**3.4**
Terrorist or Nation-State Attack	Unlikely	Critical	Negligible	Less than 6 hours	Less than 6 hours	**1.9**

The state plan also evaluates how North Dakota's local and tribal plans considered each hazard. North Dakota has a local and/or tribal plan for all counties in the state, with more than three-quarters of the jurisdictions fully adopting the local plan in their county area. As of November 15, 2023, 80.4 percent of jurisdictions are currently part of an approved plan or a plan that is being updated. A brief discussion of local assessment is included for each hazard.

4.0.3 Plan Integration

4.0.3.1 Local and Tribal Plans

In addition to including discussion about local assessment of risk, facts and assessment information from local plans are included throughout the plan. Potential mitigation strategies from local and tribal hazard mitigation plans were discussed with the SHMT and considered for state adoption as well.

4.0.3.2 Other Plans

Data from other plans generated within the state was used to help inform the plan, develop mitigation strategies, and discuss advances in community resilience. Among those plans consulted and referenced in the plan were those from the North Dakota Department of Transportation, North Dakota Department of Water Resources, North Dakota Department of Health, and North Dakota Department of Emergency Services. A full list of other state plans integrated into this plan is in Appendix E.0.

The EMAP standards are also integrated into the plan (EMAP, 2023). These voluntary standards for disaster preparedness and emergency management shape how the consequences of hazards were evaluated and assessed for this plan.

4.1 Flood

4.1.1 Overview

4.1.1.1 Description

Flooding is the flow of water over normally dry land areas. It can be caused by the overflow of inland waters, heavier rainfall than normal during a particular period, snowmelt, or the runoff of surface waters from any source. Floods are typically a natural phenomenon but are often intensified by the alteration of natural conditions by human activities. It's important to remember that flooding can occur anywhere precipitation occurs. In North Dakota, floods generally occur along rivers and streams, closed basin lakes, and in areas with poor drainage and/or over saturated soils. Many floods occur in North Dakota due to the ground being too frozen and/or saturated with moisture to absorb any additional water.

Garrison Dam Spillway

Carrie Beth Lasley/AtkinsRealis

The U.S. Army Corps of Engineers (USACE) manages the Garrison Dam and Spillway, which forms Lake Sakakawea from the Missouri River. The dam and reservoir help reduce the risk of flooding to downstream communities. The spillway contains 28 gates for the release of water when reservoir capacity has been reached. The spillway can pass up to 827,000 cubic feet of water per second with all gates open.

In June 2011, conditions prompted the USACE to open seven gates (USACE, 2023), passing 150,000 cubic feet of water per second. This water flowed into areas that had not flooded since the dam's completion in 1953.

Floodplains are areas of land adjacent to bodies of water that are typically inundated during flood events. When floodplains remain in their natural state, they provide many natural benefits. One of these advantages is the periodic storage of floodwaters and recharging of groundwater. Floodplains offer a strong habitat for fish and wildlife, while also providing natural flood and erosion control. Additionally, they help to maintain surface water quality and reduce flood damage, enhancing public safety, and providing other benefits. When floodplains remain in their natural state, flood damage to the surrounding development can be reduced or avoided.

Damage occurs when structures and infrastructure are constructed within the natural floodplain. People, property, critical facilities, structures, and infrastructure constructed in flood risk areas are in harm's way when floods occur and are often adversely impacted by floodwaters. Historically, vacant real

estate near a water source has been attractive for development, and many natural floodplain areas have been developed despite the risks. When natural floodplains are developed, the risk of flood damage increases. Changes to the land cover impact rainfall absorption and runoff and can increase the velocity and volume of flood waters.

Development in floodplains increases the area of impervious surfaces (i.e., roads, roofs, etc.). These types of surfaces prevent rainfall from infiltrating into the ground and decrease the travel time for runoff to reach a stream, river, or other natural drainage basin. When land is covered by impervious surfaces rainfall pools and runoff reaches waterways and drainage basins more quickly than under natural conditions. Decreases in rainfall absorption and increases in runoff speeds cause the severity of floods and their negative impacts to be more extreme.

North Dakota experiences several types of flooding including closed basin flooding, flash flooding, ice jams, levee failure, high dam releases (planned), and riverine flooding. For example, when heavy snowpack combines with a rapid warming trend it can extend or enlarge a flood event. Additionally, heavy spring rains that melt snowpack can cause severe seasonal flooding. Flooding events in North Dakota can also be extended in duration when more intense summer rainfall follows spring high-water. Each type of flooding that occurs in North Dakota is described below.

Major Disaster Declaration declared on March 24, 2009 (DR-1829). Significant flooding occurred as a result of spring thaw, snow, and torrential rains. Numerous bridges and roads were damaged and washed out. Significant numbers of livestock perished. The ND National Guard evacuated 20 residents of Linton, many from the "Old Town" area. Several homes were purchased in Linton and Emmons County as part of the mitigation process.

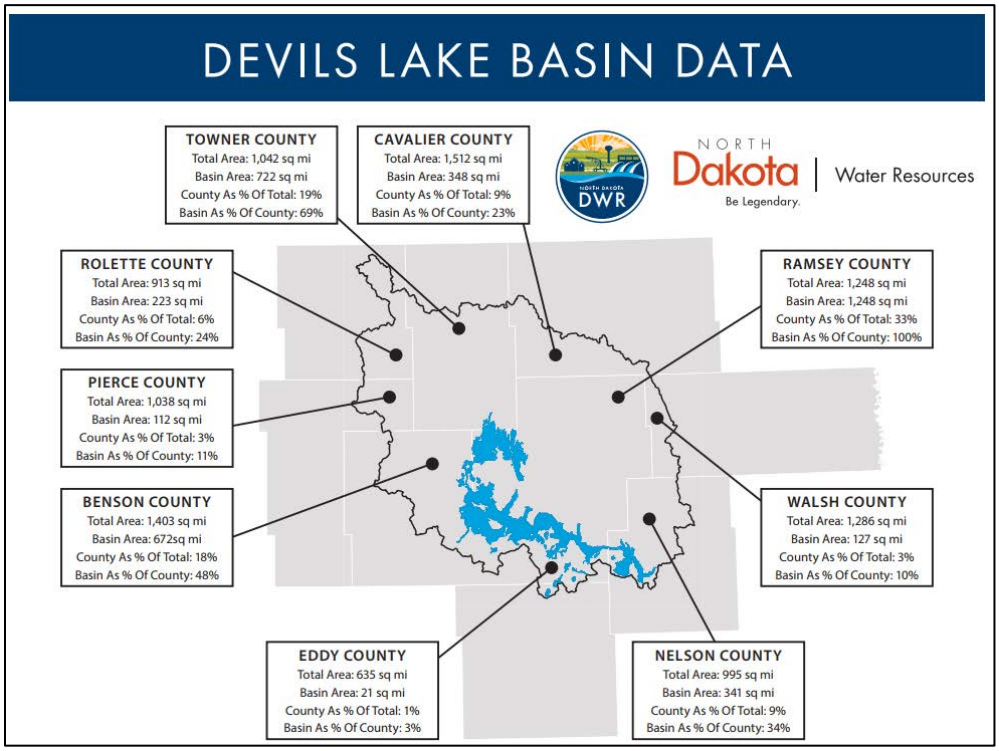
(Emmons County Multi-Jurisdictional Hazard Mitigation Plan, 2020)

4.1.1.1.1 Closed Basin

Closed basin flooding occurs on lakes, ponds, and sloughs with nonexistent or infrequently used outlets. It happens when there are seasonal increases in rainfall and/or snowmelt that cause water levels to rise. Water can only leave these lakes through evaporation, transpiration, seepage into the ground, or through natural or manmade (i.e., pump or drain) outlets. The water may stay elevated at flood levels for weeks, months, or even years when a closed basin floods. There are thousands of closed basin lakes, ponds, and sloughs in ND, according to North Dakota Department of Water Resources (DWR, 2023) data. Many closed basin lakes are located north and east of the Missouri River in an area known as the Prairie Pothole Region. If the water level in a lake rises sufficiently enough to overflow, it will spill to the next connecting pothole. In some cases, water levels can be high enough to connect multiple potholes to form larger lakes and sloughs. This causes land which is normally dry to be inundated with water during wet periods.

The largest closed basin lake in North Dakota, Devils Lake, has been in a state of continuous flooding since the mid-1990s. An overview of the Devils Lake Basin is shown in **Figure 4.1-1** (DWR, 2004).

Figure 4.1-1: Devils Lake Basin Information



Source: DWR, 2004

Since 1993, this lake has risen dramatically and overflowed through the Jerusalem Coulee into nearby Stump Lake, beginning in August of 1999. Since then, the combined Devils Lake and Stump Lake water levels have risen as one large lake. Devils Lake has generally been on the rise since its lowest recorded point in October 1940 (DWR, 2004; DWR, 2023). Intermittent annual lake level records began around 1867, while daily reports have been collected by the U.S. Geological Survey since the early 1930s.

4.1.1.1.2 Flash Floods

A flash flood is when a fast-moving, high volume of water flows into a normally dry area causing water levels to rapidly increase in a short period of time. The National Weather Service (NWS, 2023) considers a flood event to be a flash flood when the water rises rapidly above anticipated flood levels within six hours of an event that causes flood conditions. Events such as intense rainfall, thunderstorms, rain on snow, ice jam releases, and dam, dike, or levee failures can lead to this type of flooding. Flash floods can also occur when culverts are obstructed with debris, causing the water to back up and overflow.

Flash floods occur rapidly and have devastating impacts. It only takes a few inches of fast-moving water to lift people off their feet. Additionally, approximately 12 inches of water can sweep away cars and other vehicles (FEMA, 2023).

Flash flooding can occur in remote, rural, and urban areas. In urban areas, this type of flooding is typically a result of development increasing the amount of impervious surface in a drainage basin. Impervious surfaces (i.e., asphalt) prevent water from being absorbed into the ground and speed up the flow of rainfall water into drainage systems. When urban stormwater drainage systems are overwhelmed due to sudden high volumes of rainfall runoff, it can lead to flash flooding.

4.1.1.1.3 Ice Jams

Ice jams are a common source of flooding in North Dakota and can happen during freeze-up or ice-out periods. As frozen rivers begin to thaw, the ice breaks up into pieces called floes. These floes are carried along by rivers and streams, often jamming at narrow places like bends, bridge crossings, culverts, and shallow areas. When these ice floes pile up and restrict or block the flow of water, they form a barrier. This is referred to as an ice jam by the National Weather Service (2023). Ice jams can cause water levels to rise upstream which can lead to flooding. Flooding from an ice jam is comparable to a levee failure or a flash flood because if an ice jam bursts, all the water that has built-up upstream is suddenly released. Due to the sudden and unpredictable nature of ice jams, there is significant uncertainty in forecasting when and where they may occur.

4.1.1.1.4 Levee/Floodwall Failure

Levees are man-made structures built along rivers and other waterways to protect areas from flooding. The Code of Federal Regulations defines a levee as "a man-made structure, usually an earthen embankment, designed and constructed in accordance with sound engineering practices to contain, control, or divert the flow of water so as to reduce risk from temporary flooding" (44 C.F.R. 1.B.59.1 § 59.1, 2023). Floodwalls serve the same purpose, but are pre-engineered vertical barriers that are typically made of concrete or steel and are designed to hold back flood waters. Floodwalls are often constructed on the crown or top of a levee to increase the levee height, according to FEMA's "What is a levee fact sheet" (FEMA, 2023). Floodwalls may be permanent or temporary in nature.

> Several rural residential subdivisions are exposed to a high risk of flooding as these were built near or adjacent to the river for its scenic beauty and amenities.
>
> *(Cass County Multi-Jurisdictional Hazard Mitigation Plan, 2019)*

While levees and floodwalls are designed and built to provide flood protection, they can never fully eliminate flood risk. Flood events that are larger than they were designed to withstand can cause overtopping or a breach. According to the USACE in its "So, You Live Behind a Levee" publication (USACE, 2010), overtopping is when floodwaters rise above and pass over the crown (i.e., top) of the levee, and a breach occurs when a portion of a levee gives way and creates an opening that floodwaters can pass through. In either scenario, floodwaters built up behind a levee or floodwall can rush over or suddenly burst directly through a levee. According to FEMA's "Emergency Preparedness Guidelines for Levees" (FEMA, 2018), when levees fail, the outcome is often catastrophic.

4.1.1.1.5 High Dam Release

While dam failure is discussed as a separate hazard, the operation of a large dam can also lead to downstream flooding. FEMA defines a dam as, "an artificial barrier that has the ability to impound water, wastewater, or any liquid-borne material, for the purpose of storage or control of water" (FEMA, 2018). A dam release is when water is intentionally released through an outlet or spillway, even if such releases exceed normal downstream water levels (Association of State Dam Safety Officials, 2023). There are 950 dams in North Dakota, according to the USACE National Inventory of Dams (NID, 2023). Of these, 54 are high hazard dams and 65 have medium hazard potential. These dams may experience high-water levels, requiring a greater volume of water to be intentionally released downstream for

undetermined and adaptive periods. Additionally, there are 45 dams with undetermined hazard potential, while the 786 remaining dams have low hazard potential (NID, 2023). Approximately 85 percent of dams in North Dakota with high hazard potential have an Emergency Action Plan (EAP). Of all dams in the state, 95 percent of them are state regulated, while 9 percent are federally regulated.

4.1.1.1.6 Riverine Flooding

According to the Code of Federal Regulations (CFR), a riverine flood occurs in a water body "relating to, formed by, or resembling a river (including tributaries), stream, brook, etc." (44 CFR 1.B.59.1 § 59.1, 2023). These bodies of water flood when their levels rise enough to cover normally dry land areas. Increases in water levels are generally caused by rainfall, runoff, snowmelt, or a controlled dam release. When normally dry land is inundated by riverine flooding, there is a risk to many people and the development in those areas. Riverine floodwaters can move at high speeds and often contain rocks, earth, and other dangerous debris.

FEMA, communities, and private parties have developed techniques to map past and predicted riverine flooding in order to identify flood risk. For many of North Dakota's riverine water bodies, the United States Geological Survey (USGS) tracks when the water rises to flood heights using gages placed on streams and rivers. This provides a method to track and provide warning to residents when riverine floods are anticipated or occurring. North Dakota has a history of riverine flooding (see Section 4.4.1.1.2) that poses a significant risk to residents, structures, and infrastructure built in floodplains.

4.1.1.1.7 Other Flooding

There are additional types of flooding that North Dakotans may experience, due to either groundwater or overland flow. According to the USGS (2023), groundwater is water that exists beneath the land surface and fills the pores and cracks in the ground like water fills a sponge. Groundwater flow is "streamflow which results from precipitation that infiltrates into the soil and eventually moves through the soil to a stream channel" (NWS, 2023). According to the NWS, groundwater flow can cause flooding by unexpectedly bringing water into areas that are otherwise dry.

Prairie potholes, as defined by the US Environmental Protection Agency (EPA), are depressional wetlands in formerly glaciated landscapes that fill with water during precipitation events or with the spring snowmelt (EPA, 2023). The creation of a temporary wetland is also technically flooding, but these wetlands serve as a valuable ecosystem for migratory birds and can store water that might otherwise contribute to flash or regular flooding.

The City of Munich has experienced several disasters since the last mitigation plan update, but flooding has been significantly impactful. Spring flooding along with spring wastewater discharge issues have been the most prevalent impact over the past five years. The city was unable to open lagoon valves in the spring resulting in lift pumps over filling the lagoon. Plugged sewers over flooded the sewers due to power outages. In addition, plugged culverts in the spring caused a backup of water into basements and yards of residents.

(Cavalier County Multi-Jurisdictional Hazard Mitigation Plan, 2023)

Overland (sheet, landscape, or areal) flooding may be similar in cause to flash flooding but generally develops over a longer period of time and persists for a longer duration (NWS, 2023). In areas of flat terrain, overland flooding can result from overflow of water adjacent to a river that extends far beyond the normal river channel. During the spring flood of 2022, hundreds of square miles of farmland in northeastern North Dakota were inundated by flood water ranging from 2 inches to 12 feet in depth and for a period of from 3 days to 3 weeks (Gust, Sep 2022; FEMA, 2022). Overland flooding also forms as excessive runoff from snowmelt and/or rainfall accelerates down a steeper slope or escarpment, coalesces in the flatlands as water velocity slows, and temporarily overwhelms the local drainage system (BTSAC, 2012; Engels, 2019). During the spring snowmelt, lower elevation rivers and streams often remain ice covered or ice encumbered while valley benchlands, at higher and more (warm air) exposed elevations, thaw more quickly and produce a layer of surface runoff that overtops the lower valley snowmelt and runoff.

4.1.1.2 Previous Occurrences

Flooding is a costly natural hazard that poses risk to life and wellbeing, property, industry, crops, and infrastructure. North Dakota has significant flood risk and a long history of flooding. Since 1996, North Dakota has experienced more than 1,000 flood events, with 32 events receiving Presidential Disaster Declarations. The state has experienced 19 flood events where the cost of damages exceeded $2.5 million, per flood event. A summary of North Dakota's costliest flood events is provided below.

- **2023 Floods – Missouri and Mouse/Souris River Basins --** Heavy snowmelt and rainfall caused this set of flood events. One person lost their life as a direct result of the flood. Infrastructure damage was significant in many counties. Impacted communities include the counties of: Walsh, Grand Forks, Cass, Dunn, Morton, Richland, Pembina, Golden Valley, McHenry, Mountrail, Wells, LaMoure, Ward, Mercer, Ransom, Dickey, Stutsman, Burke, Rolette, Hettinger, Foster, and Traill.
- **2022 Floods – Missouri, Red, Devils Lake, and James River Basins --** Heavy rain caused this series of flash flood events. Transportation infrastructure was impacted in Wells County where flash flooding caused nearly all roads to be inundated. Infrastructure was overwhelmed in some communities, such as storm sewers in the cities of Bismarck and Dickinson. In Dickinson, over 150 residences and businesses experienced flood damage. Impacted communities include the counties of: Traill, Grand Forks, Hettinger, Eddy, Wells, Stark, Stutsman, Ransom, and Burleigh.
- **2019 Floods – (1) Red River Basin --** Heavy snow melt caused the first set of flood events in 2019. The impact to transportation infrastructure was significant due to snowmelt ponding in large sections of land, flooding roads and low-lying areas. Impacted communities include the counties of: Morton, Cass, Traill, Steele, Ransom, Sargent, Grand Forks, Walsh, and Pembina.

  (2) Devils Lake, Missouri, and Red River Basins -- Heavy rain caused the second set of flood events in 2019. Two people lost their lives and two people were injured from a portion of BIA Road 3 being washed out. The impacts to transportation infrastructure were severe. Impacted

> Overland flooding also causes seepage into the sanitary sewer system causing backups damaging people's homes, blocks bus routes for transportation of children to school, and limits access for emergency services [in Cleveland].
>
> *(Stutsman County Multi-Jurisdictional Hazard Mitigation Plan, 2021)*

communities include the counties of: Burleigh, Cass, Sioux, Emmons, Benson, Pembina, Ramsey, Nelson, Grand Forks, Wells, Steele, Sheridan, Traill, Nelson, and McKenzie.

- **2011 Floods – Statewide --** Heavy snowmelt and rain fall caused this series of flood events. This statewide event caused an estimated $1.5 billion in damage, both to property and crops. The impact to infrastructure was significant due to riverine, ground, and overland flooding. Many critical facilities were impacted, in some cases causing a loss of potable water for communities for extended periods of time. For example, the City of Fargo experienced 150 days above flood stage. Devils Lake experienced its record modern-day lake elevation. The City of Minot sustained massive damage and lost municipal water supply when levees overtopped. Impacted communities include 48 of 53 North Dakota counties and 3 of 5 Tribal Nations.

  This was a multi-state disaster where the Missouri River was in flood stage in each state through which it flows. And for the full 2011 Water Year (Oct 2010 through Sep 2011), *record water year flows* were measured on the Assiniboine River at its juncture with the Red River of the North in Winnipeg MB, Canada, along with its Mouse/Souris Tributary through North Dakota; the Red River of the North From Fargo, north through Pembina and into Winnipeg MB; and the Missouri River through from North Dakota into St. Louis, MO (USGS, 2013).

- **2009 – Missouri, James, Devils Lake, and Red River Basins –** Above normal snowpack caused widespread flooding. For example, peak streamflow records were set on the Red River at Fargo, James River at LaMoure, Spring Creek at Zap, and Beaver Creek at Linton. Significant ice jams occurred on the Missouri River at the Double Ditch area and confluence with the Heart River in the Bismarck/Mandan area. Response actions included sandbagging, shutting off releases from Garrison Dam, and using explosives.

- **2001 Floods – Devils Lake Basin --** A closed basin caused these flood events. The impact to transportation infrastructure was significant with overland flow closing Highways 1, 2, and 19. Significant investment and progress were lost on road and utility projects that were repairing damage from the 1999 floods. The waterways around the basin were also inundated, causing riverine flooding near the lake as well.

- **2000 Flood – Red River Basin --** Heavy rain caused this flash flood event. More than 50 percent of the homes and residences in the City of Fargo experienced flood damage. The impact to transportation infrastructure included many roads being impassable and closed for days after the event. Critical facilities were impacted, including inundated storm sewers and loss of electricity and phone service to 20,000 households. Impacted communities include the cities of Fargo and Moorhead.

- **1999 Floods – Devils Lake Basin** -- The 1999 floods are a particularly eventful year in part of a long-term flooding pattern that began in 1993 when the lake began to grow that continues to this day in 1999. More than 100 people participated in a community-wide buyout due to closed-basin flooding. The impact to transportation infrastructure included many roads being closed during the flooding, some permanently. Critical facilities were impacted, including inundated sewers and sewer lagoons. Impacted communities include Devils Lake, Churchs Ferry, and Minnewaukan. These impacts are an example of damage experienced during one year of a multi-year flood event.

- **1997 Floods – Missouri and Red River Basins --** Heavy snowmelt and dam releases caused this series of overland flooding. In some areas, the Red River was estimated to be 20 miles wide. Over 50,000 people were evacuated from their homes due to this series of flood events. The impact to transportation infrastructure was significant with overland flow closing Interstate 94 and 29, many local roads, and airports. One critical facility was closed due to inundation, leaving the community of Grand Forks without drinking water for three weeks. Impacted communities include Casselton, Amenia, Mapleton, Wahpeton, Harwood, Hickson, Fargo, Grand Forks, Grafton, Edmore, Pembina, Drayton, Leeds, and Bowesmont.

Since 1997, acquisition projects have been successful in removing properties from flood prone areas. Over 800 flood -damaged structures have been removed from the Red River Valley.

(Walsh County Multi-Jurisdictional Hazard Mitigation Plan, 2021)

Summary statistics of flood events from 1996 to 2022 are included in **Figure 4.1-2**. Flood events in North Dakota typically occur due to five primary causes: heavy rain or snowmelt, riverine flooding, ice jams, dam or levee breaks, and planned dam releases. Heavy rain or snowmelt and riverine flooding cause most events in the state, resulting in the most loss of life and injury. The financial impact of flood events over this period exceeds $4 billion dollars between property and crop damage. Significant impacts are also experienced due to at risk infrastructure causing road closures, evacuations, structural damage, and failure of critical facilities.

Figure 4.1-2: Impact of Flood Events 1996-2022

Cause	Events	Deaths	Injuries	Property Damage	Crop Damage	Other Impacts
Heavy Rain/Snow Melt	897	8	2	$339,102,000	$97,592,000	Road Closures and damage, Critical Infrastructure failure/damage, Evacuations
Riverine	232	4	5	$3,579,415,000	$57,000,000	
Ice Jam	19	0	0	$4,351,000	$45,000	
Dam/Levee Break	1	0	0	$1,000	$-	
Planned Dam Release	3	0	0	$6,300,000	$-	
Grand Total	1,152	12	7	$3,929,169,000	$154,637,000	

Source: NCEI, 2023

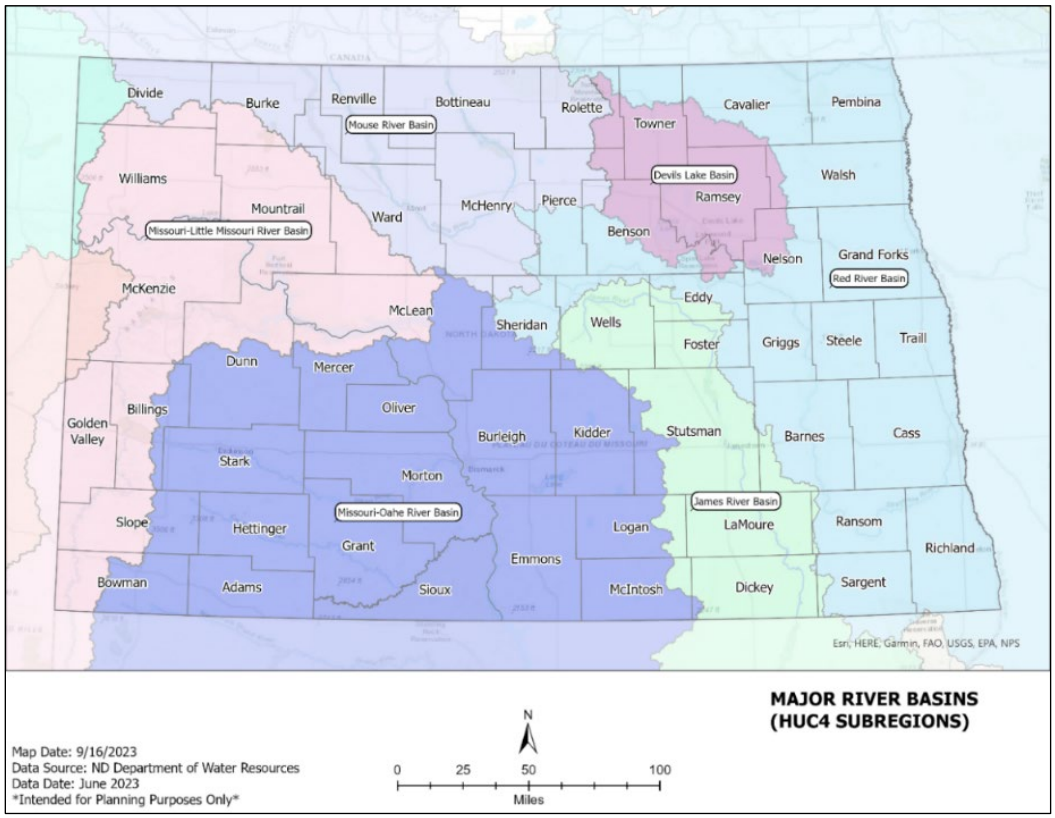
4.1.1.3 Location and Extent

If it rains or snows, it can flood. Forty percent of all National Flood Insurance Policy claims (NFIP, 2022) are from outside the mapped flood hazard areas. Flooding is North Dakota's most costly and repetitive natural hazard. All 53 counties and four tribal nations have experienced severe damage and losses to public and private property due to flood events. North Dakota is susceptible to flooding due to its geographical features, climate conditions, and intricate network of basins. Five primary river basins compromise North Dakota's flood risk: the Missouri River Basin, Mouse/Souris River Basin, Devils Lake Basin, James River Basin, and Red River Basin. Descriptions of these basins based on information from the North Dakota Department of Water Resources are below and displayed in **Figure 4.1-3**. Additional significant flood information was provided by the National Weather Service and U.S. Geological Survey offices in Bismarck and Grand Forks.

- **Missouri River Basin** -- The Missouri River Basin drains over half a million square miles with about 9,700 of those square miles being in Canada. The headwaters of the Missouri River Basin form in the neighboring state of Montana where it then begins being dammed and dam structures continue until it meets its confluence with the Mississippi River. As a river that is greatly impacted by snowpack, the Missouri River poses significant spring flood risk. Additionally, the Missouri River compromises 80 percent of North Dakota's streamflow. There have been 7 significant flood events in the Missouri River basin over the 1996-2023 period, occurring in 1997, 1999, 2009, 2011, 2019, 2022, and 2023.
- **Mouse/Souris River Basin --** The Mouse/Souris River originates and terminates in Canada, looping down into northwestern North Dakota and draining about 23,600 square miles. In Canada, and federally, the Mouse River is referred to as the Souris River, thus the combined term Mouse/Souris that is used herein. As a river that meanders about 357 miles through North Dakota, it travels through a variety of terrain including hills, and flat glacial lake plains. Some tributaries originate in the Turtle Mountains. There have been two significant flood events in the Mouse/Souris River basin over the 1996-2023 period, occurring in 2011 and 2023.
- **Devils Lake Basin --** The Devils Lake Basin, a naturally occurring closed basin with two man-made outlet structures, is in northeastern North Dakota and drains 3,810 square-miles. As a closed basin lake with large fluctuations in elevation, Devils Lake impacts surrounding, small lake-side communities. When Devils Lake reaches an elevation of 1,447 feet it begins to overflow into Stump Lake via the Jerusalem Coulee. At elevation 1,458 feet Devils Lake and Stump Lake overflow to the Sheyenne River via the Tolna Coulee. The two outlet structures have a combined capacity to release up to 600 cfs -- 250 cfs from the West End Outlet, and 350 from the East End Outlet, depending on downstream channel capacity and water quality. There has been a continuous flood event in the Devils Lake basin over the 1996-2023 period, largely due to a wet cycle that started in the early 1990s. In June 2011, the lake reached its modern-day record high elevation of 1,454.3 feet. It is estimated that without construction of the west and east end outlet structures, the lake elevation may have reached as much as 6 feet higher, leading to a potentially catastrophic overflow. (Note: All elevations related to Devils Lake are referenced to the National Geodetic Vertical Datum of 1929).
- **James River Basin** -- The James River basin drains about 22,000 square miles and originates in North Dakota, meandering through North Dakota and South Dakota before reaching its confluence with the Missouri River. Like many rivers in the Midwest of moderate length and moderate flow, the James River has been dammed, just north of the community of Jamestown, while dam releases have demonstrated the potential to greatly reduce downstream flooding, through southeastern North Dakota.
- **Red River Basin --** The Red River basin drains about 40,200 square miles in ND, SD, MN, and Canada. It serves as the border between North Dakota and Minnesota. As a meandering river with shallow channels, the Red River basin poses significant flood risks to people and property as heavy snowpack and melt and heavy rainfall have great potential to overtop the banks. Fargo and Grands Forks are population centers in the Red River Basin. There have been more than a dozen significant flood events in the Red River basin over the 1996-2023 period, occurring in 1997, 2000, 2001, 2002, 2006, 2009, 2010, 2011, 2013, 2019 (2), 2020, and 2022. The June 2000

and Sep/Oct 2019 floods were primarily flash flood/overland flood episodes while the remaining were a combination of primarily riverine and overland flood episodes.

Figure 4.1-3: North Dakota River Basins



Source: ND DWR, 2023

Figure 4.1-4 and **Figure 4.1-5** show the extent of flooding (National Risk Index, 2023) and number of events by leading counties since 1996 (NCEI, 2023) along with the population impacted (National Risk Index, 2023). Richland (78), Grand Forks (74), and Cass (71) lead the number of events with more than 70 each. While Cass County, where Fargo is located, has the largest population exposed to flood events, Pembina County has the most flooded area.

Figure 4.1-5 Location of Flooding Impacts by County, 1996-2023

County	Events
Richland	78
Grand Forks	74
Cass	71
Benson	65
Ramsey	61
Nelson	59
Walsh	53
Pembina	46
Sargent	45
Ransom	43

Source: NCEI, 2023

Figure 4.1-4: Extent of Flooding Impacts by County, 1996-2023

County	Impacted Area (sq. mi.)	Pop.
Pembina	225	6,825
Walsh	178	10,553
Cass	157	184,441
Richland	88	16,521
Grand Forks	71	73,042
Traill	70	7,997
Stark	25	33,613
McHenry	21	5,344
Mercer	20	8,350
Morton	13	33,242
Hettinger	13	2,487
Wells	12	3,976
Ward	12	69,879
Ransom	11	5,692

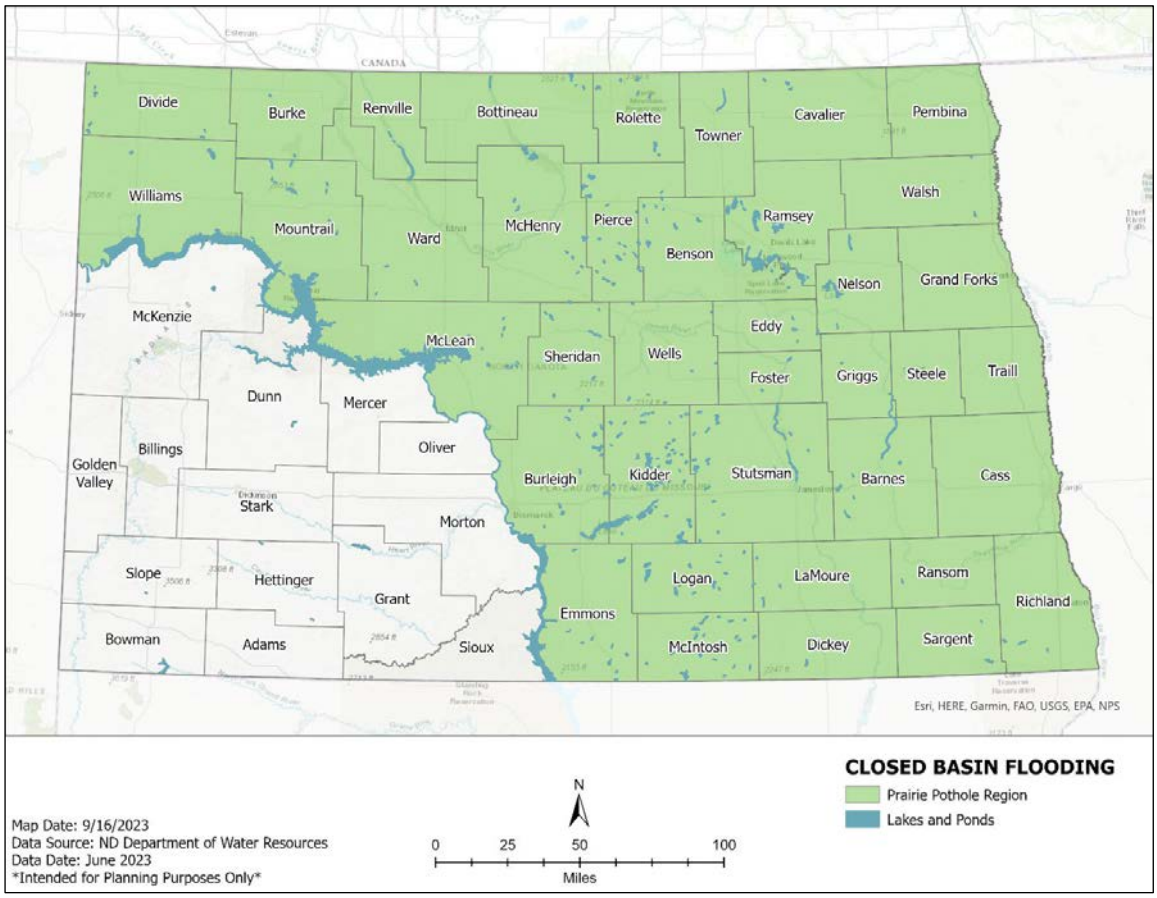
Source: NRI, 2023

4.1.1.3.1 Closed Basin

North Dakota experiences “closed basin” flooding, which occurs when wetter than average weather conditions result in increased rainfall or snowmelt runoff entering these basins, causing higher than normal water levels. Closed basins typically have outlets that are unable to discharge this surplus water, making them highly sensitive to changes in climatic conditions. According to the North Dakota Department of Water Resources Department (DWR, 2023) and its Closed Basin & Lake Flooding brochure, North Dakota has thousands of closed basin lakes, ponds, and sloughs.

The area north and east of the Missouri River is known as the Prairie Pothole Region, shown in green on **Figure 4.1-6.** Small depressions in the primarily flat topography of the state fill with water when there is snowmelt or precipitation. Under conditions of excessive precipitation they may fill, overtop their shallow banks, and merge with other prairie potholes creating larger ponds. These may eventually produce larger scale overland flooding that fills fields and covers roadways.

Figure 4.1-6: Closed Basin Flooding Areas in North Dakota



Source: ND DWR, 2023

The rich prairie soils of the pot-hole region supports agricultural cultivation and cropping, while decades of rural road networks, farm and community drainage practices, and larger transportation corridor development have increased surface runoff of both spring snow melt and summer season storm water. During periods of rapid snowmelt and/or heavy rainfall, the ditch network which has been developed to

collect runoff can fill and overflow into neighboring properties and roads. Thus, any large rain event can create overland flooding and loss of roadways.

One example of a significant closed basin lake is Devils Lake in northeast North Dakota, a subbasin of the Red River of the North Basin. According to the ND DWR (2023), between 1940 and 2011 this lake's water elevation level has risen by more than 53 feet, partly as recovery from the 1930s era drought, and partly in response to the excessively wet period which began in 1993. Since 1993, rising water levels have resulted in the flooding of tens of thousands of acres of agricultural land. Water level increases have also forced homes, roads, and other facilities to be moved and/or abandoned. Other closed basin lakes in ND that have been experiencing fluctuations in water levels due to climactic conditions include:

- Stump Lake – Near Devils Lake in northeast North Dakota, and
- Rice Lake – In southeastern Emmons County, near Hauge, North Dakota

Stump Lake is located east of Devils Lake but has become a part of Devils Lake since that lake level rose above 1,447 feet, above mean sea level, according to the USGS (2023). A further increase in Stump Lake's water elevation above 1458 feet could cause water to spill from Stump Lake, through Tolna Coulee, and into the Sheyenne River. The USGS (2023) indicates that "an uncontrolled overflow could cause significant flooding damage downstream." Rice Lake's water level has been rising since the 1930s according to a ND DWR report (2020). In recent years, the water has risen to the extent that flooding has threatened homes, agricultural lands, and critical infrastructure (roads). ND DWR has been working with partners to explore mitigation options such as elevating roadways, and critical facilities to protect vulnerable structures and infrastructure.

Figure 4.1-7: Rice Lake flooding threatens roads.

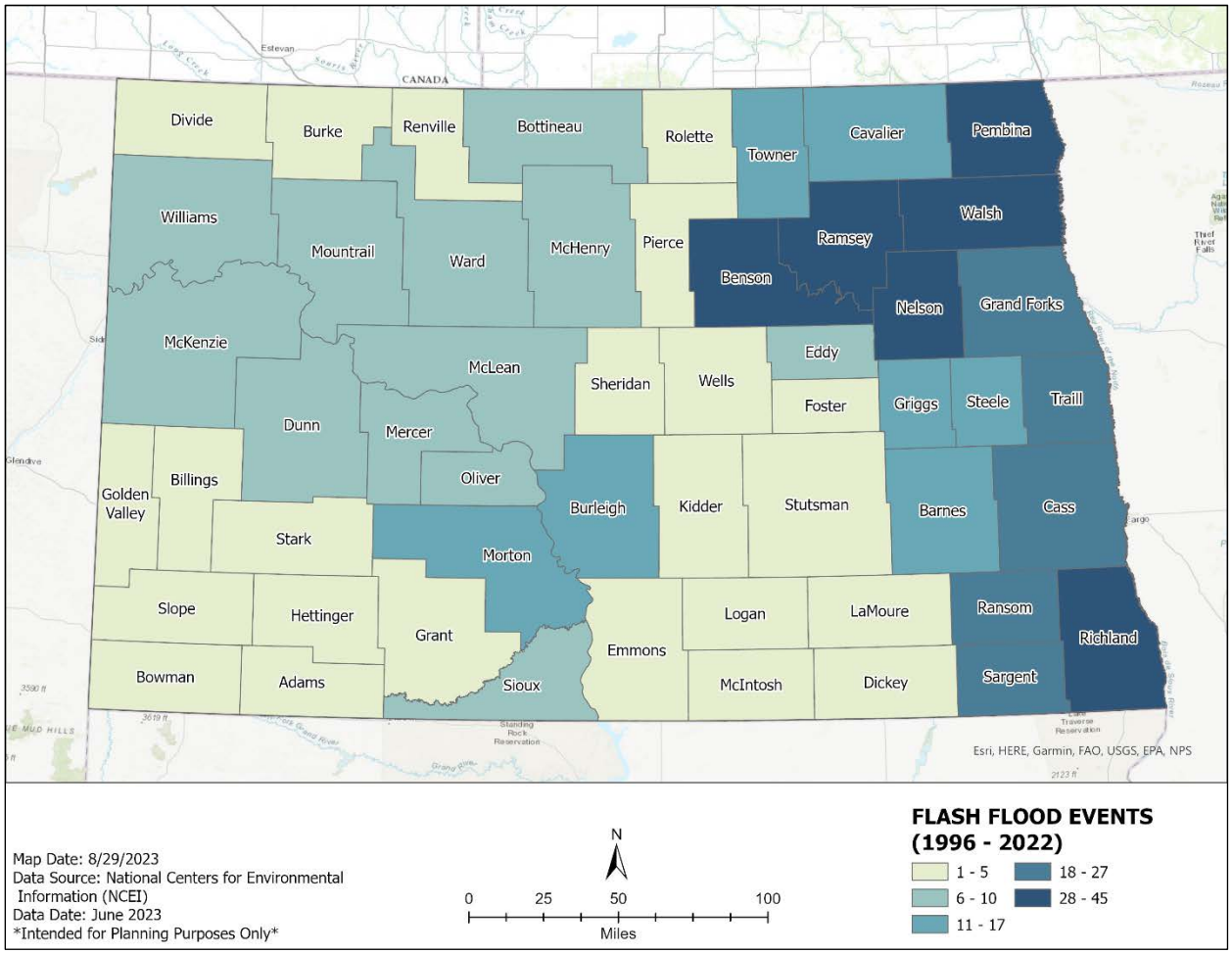
Source: DWR, 2020. Rice Lake Phase 1 Investigation Report

4.1.1.3.2 Flash Floods

Flash flooding occurs throughout North Dakota, most frequently in the far eastern portion of the state. According to NCEI data (2023) from 1996 to 2022 six eastern counties (Benson, Nelson, Pembina,

Ramsey Richland, and Walsh) experienced between 28 and 45 flash floods. Five counties had between 18 and 27 flash flood events (NCEI, 2023), and seven counties experienced between 11 and 17 flash floods (NCEI, 2023). The rest of the state experienced between 1 and 10 flash floods from 1996 to2022 (NCEI, 2023). **Figure 4.1-8** reflects the frequency of flash flood events by county during this timeframe.

Figure 4.1-8. North Dakota Flash Flooding Frequency by County, 1996-2022

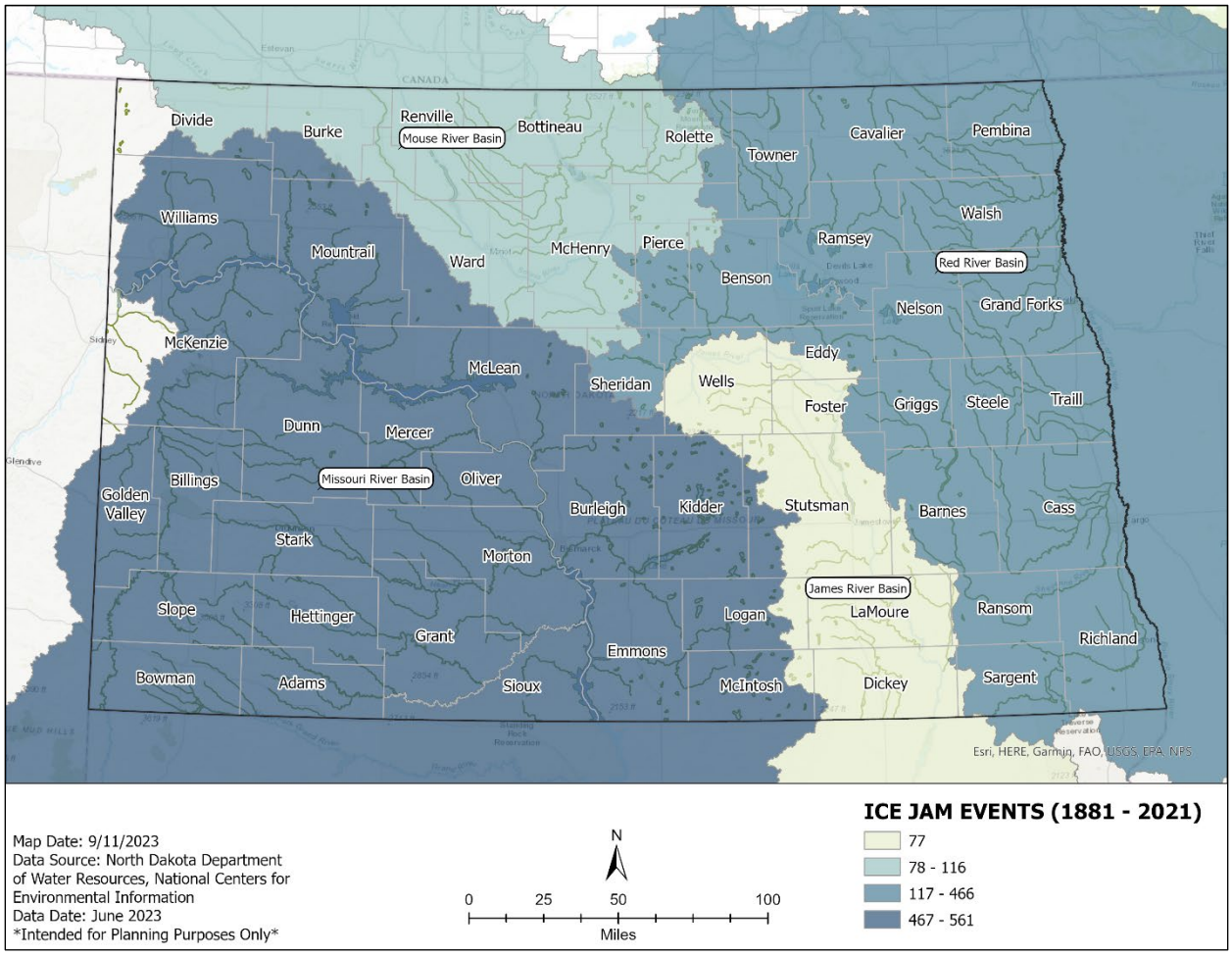


Source: NCEI, 2023

4.1.1.3.3 Ice Jams

According to the USACE, Cold Regions Research and Engineering Laboratory's (CRREL) Ice Jam Research Group (2023), ice jams happen across North Dakota but are most prevalent in the southwest and eastern portions of the state. Ice jams occur when river water freezes and then partially thaws. Under partial thaw conditions, water carries pieces of ice called "floes" downstream and these often pile up and create jams at river bends, bridges, or culverts, where river channels are narrow or shallow. From 1881 to2021 the highest volume of ice jams occurred in the Missouri River and Red River basins (CRREL, 2023; NCEI, 2023) as shown on **Figure 4.1-9**.

Figure 4.1-9. Ice Jam Frequency in ND River Basins, 1881 - 2021



Source: CRREL, 2023; NCEI, 2023

Ice jams occur quite frequently in North Dakota. In 2023, for example, an ice jam formed on the Heart River (Missouri River basin) when temperatures rose and the snowpack melted, this jam caused the water to rise and threaten property in the Mandan area. Around that same time in the Red River basin, ice jams on the Forest River caused flooding that threatened more than 20 homes in Minto (Valley News Live, 2023). Ice jams in 2009 were significant in the Missouri River and threatened the Bismarck/Mandan area, entirely blocking river flow, and leading to the USACE ceasing releases from the Garrison Dam and the National Guard using explosives to free the jam.

Figure 4.1-10: Ice Jams by River Basin 1881-2021

Basin	Ice Jams
Missouri	561
Red	466
Mouse/Souris	116
James	77
Devils Lake	29

Source: CRREL, 2023; NCEI, 2023

Figure 4.1-11. Ice jam on the Red River in Fargo

Source: Schwert, NDSU, 1995. Reprinted with permission.

4.1.1.3.4 Levee/Floodwall Failure

Levees and floodwalls are common across North Dakota. As of 2019, ND DWR (Bailly, 2019) had issued 627 permits for flood control structures, covering a total of 325 miles. In North Dakota, major flooding events have caused damage to levee systems and exposed levee system deficiencies. Levee and floodwall failures can cause flood damage to properties, critical infrastructure, and agricultural lands they were intended to protect. Damage occurs when floodwater builds up behind them and they fail releasing that built up water suddenly.

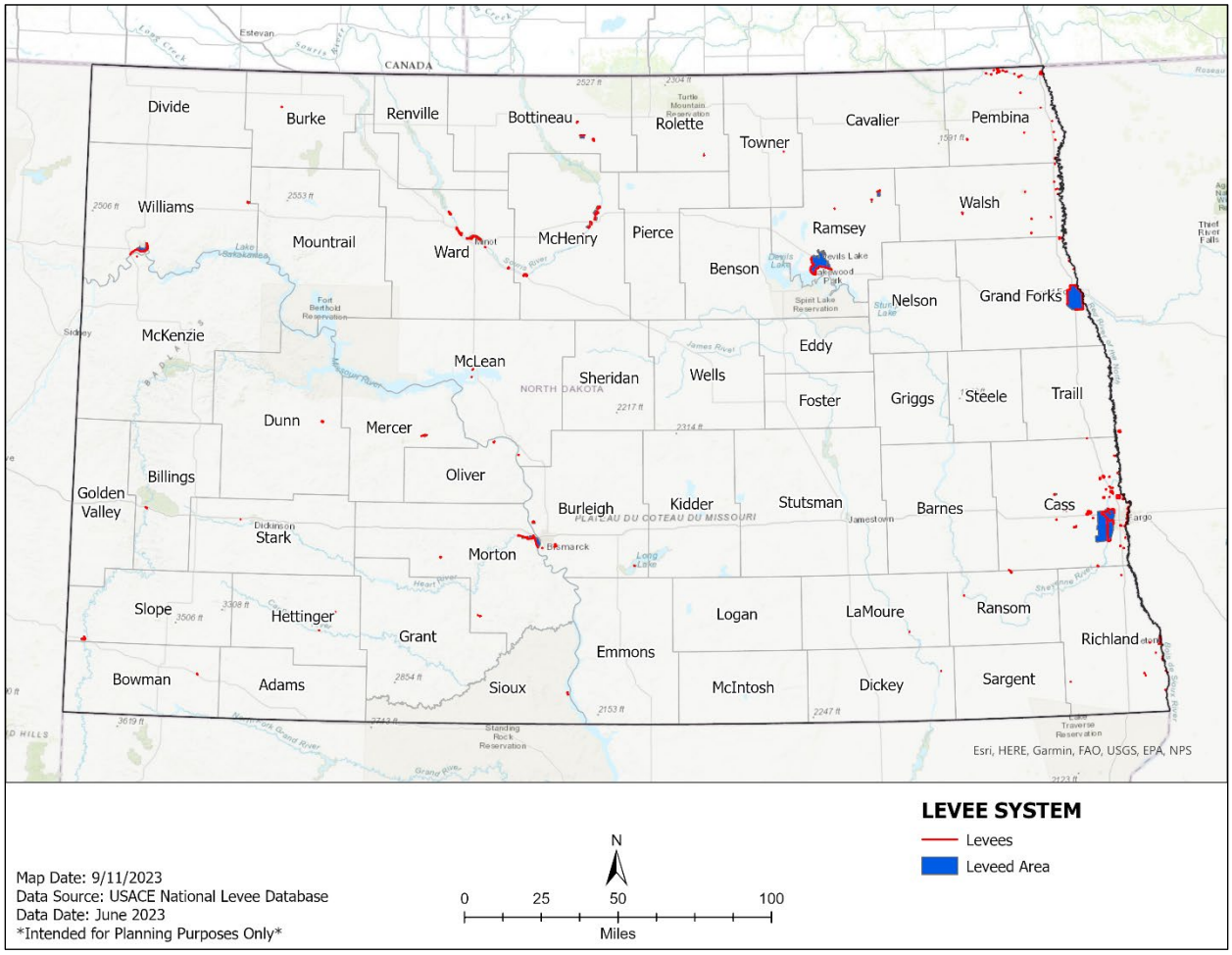
Levees and floodwalls fail when they are overtopped or breached by flood waters due to flows and water pressure that exceed what they were designed to handle, damage from debris, and lack of adequate maintenance. According to the ND Section of the American Society of Civil Engineers' Infrastructure Report Card (Bailly, 2019), many levees in North Dakota have capacity issues where they are not designed to withstand the 100-year flood event (a flood event that has a 1 percent annual-chance of occurring). The 2019 levee analysis found that additional funding is needed to address levee deficiencies and protect against levee and floodwall failures and their potentially devastating impacts.

Some memorable levee failures occurred in 1997 and 2009. During the 1997 Red River flood the Grand Forks levee was overtopped, and the levee, temporary levees, and US Army Corps of Engineers dikes were all damaged and had to be repaired or fully replaced (NPR, 2022). When water overtopped these levees and dikes the flooding triggered evacuations and caused significant damage to structures, agricultural land, and critical infrastructure (NPR, 2022). This event caused the community to look at mitigation options to move structures and infrastructure further away from the river (NPR, 2022). In

2011 record-high flows on the Mouse/Souris River led to emergency levee failure in Minot, inundating about 4,700 structures in Ward and McHenry counties, prompting efforts toward improved protections for this area of recent population growth, according to ND DWR (2023) communications.

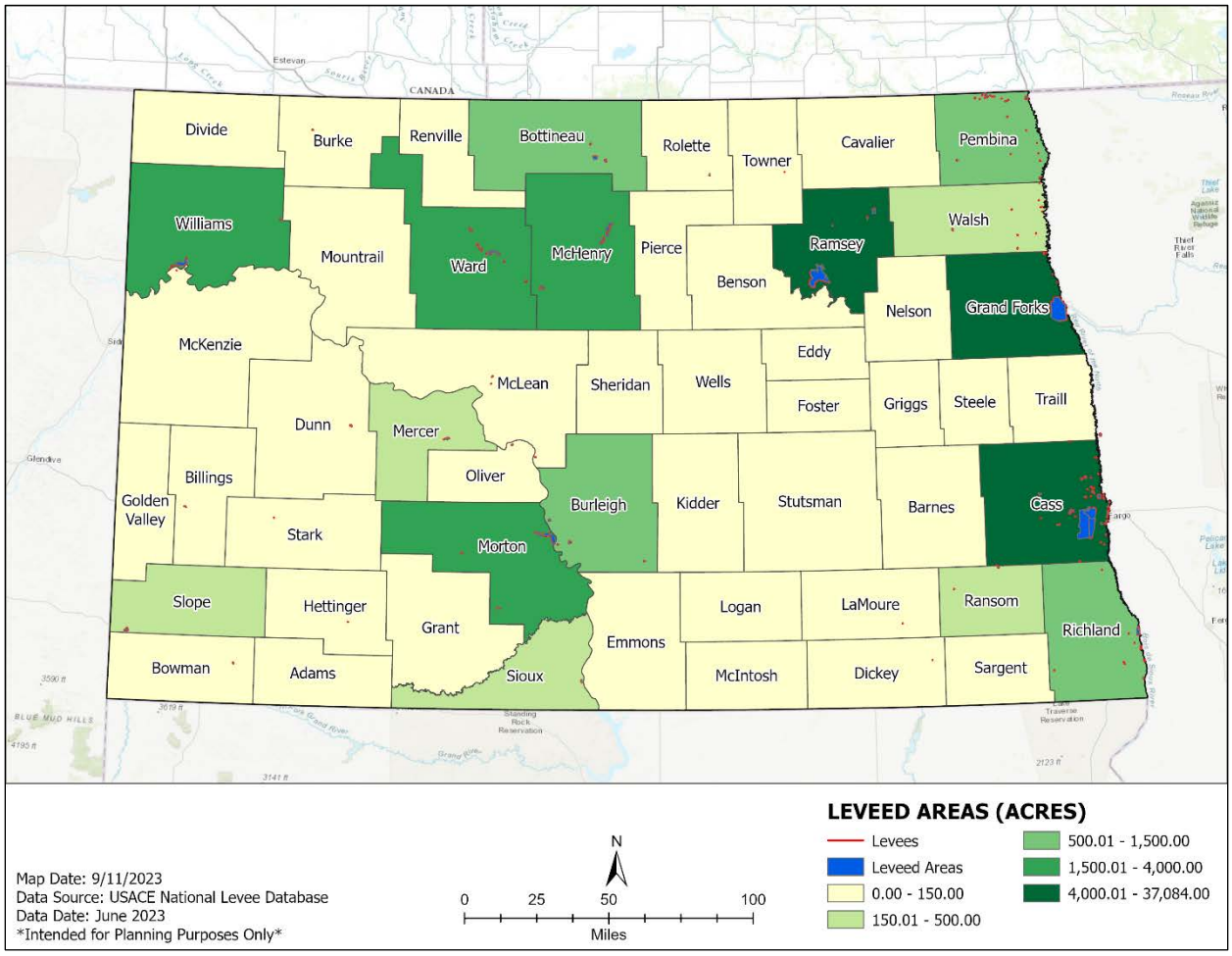
Existing major levee systems and the total acres protected by levees for each North Dakota County are tracked by the USACE's National Levee Inventory (NLI, 2023) and this information is shown on **Figure 4.1-12** and **Figure 4.1-13**. In addition, **Figure 4.1-13** shows that the largest areas protected by major levee systems in North Dakota are in Ramsey, Grand Forks, and Cass Counties. These areas have the greatest risk of damage to structures, property, critical infrastructure, and loss of life should levee failure occur due to a flood event.

Figure 4.1-12: Locations of Major Levees Systems in North Dakota



Source: NLI, 2023

Figure 4.1-13: Area (Acres) Protected by Levees by County, ND



Sources: NLI, 2023

4.1.1.3.5 High Hazard Dam Release

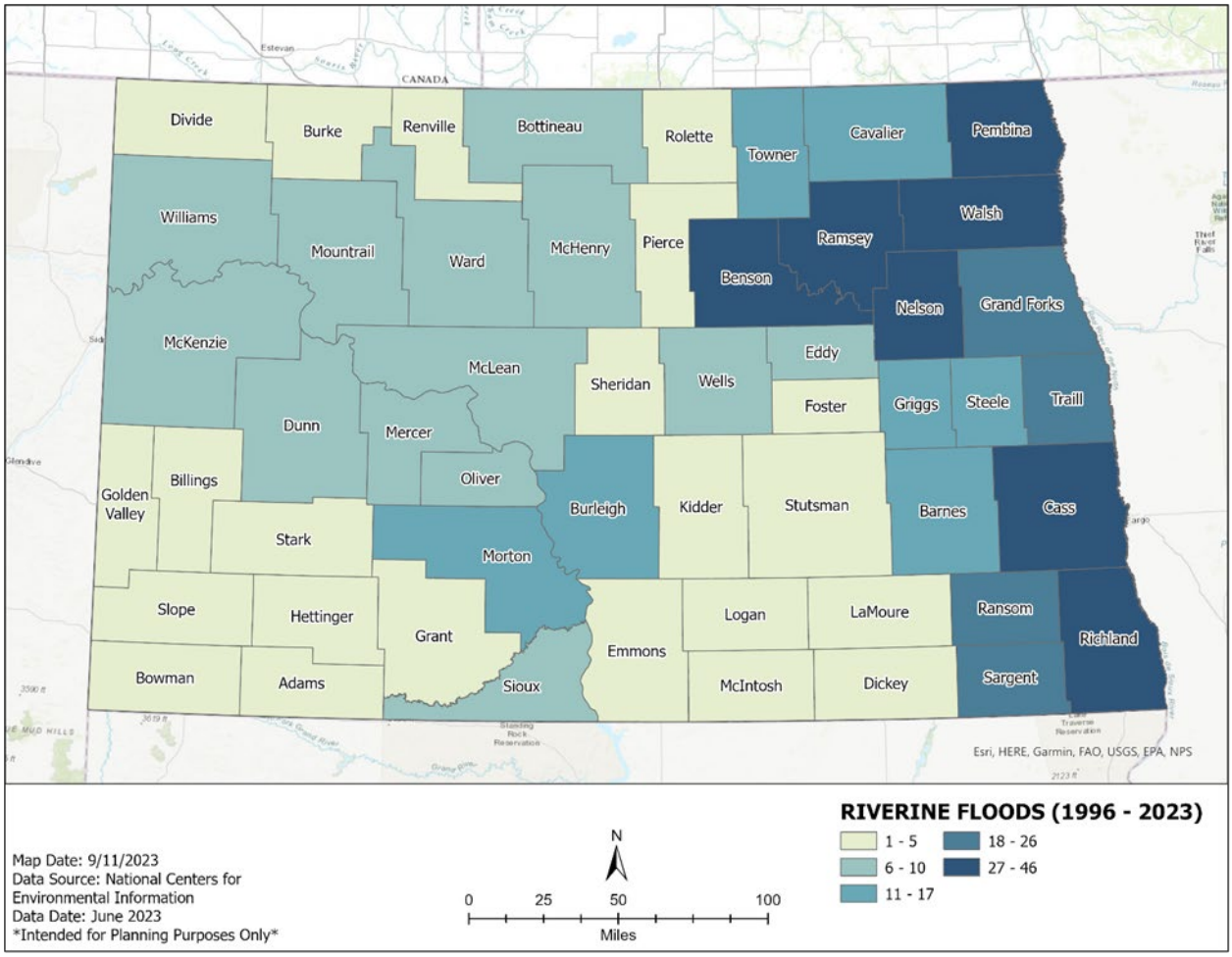
USACE's National Inventory of Dams (NID, 2023) identifies 950 dams in North Dakota and 48 of those are considered high hazard. The delineation of a high hazard dam is based on the potential impacts downstream. This means high hazard dams pose significant risks to life and property when there are high dam releases. The James River Basin has a dam with high hazard potential, as do the Red and Missouri River Basins. When water is released to a river system that is at or nearing capacity, it can lead to flooding downstream including inundation of areas that otherwise do not have significant flood risk. North Dakota is not only impacted by high hazard dams within its borders, but also experiences floods associated with dam releases from neighboring states, and Canadian territories.

4.1.1.3.6 Riverine Flooding

Riverine flooding occurs when water levels overtop the banks of streams and rivers. According to the National Centers for Environmental Information (NCEI) data, North Dakota has experienced 1,152 flood events since 1996 which impacted counties, municipalities, and tribal nations (NCEI, 2023). As shown on **Figure 4.1-14**, counties within the Red River Basin and Devils Lake Basin have experienced the highest levels of riverine flooding between 1996 and 2023. The headwaters of the James River Basin have

experienced more flood events than those in the lower portion of the basin. Additionally, in the Missouri River Basin, the riverine flooding centers around the Missouri River, as there are few other rivers in that basin contributing to flood events.

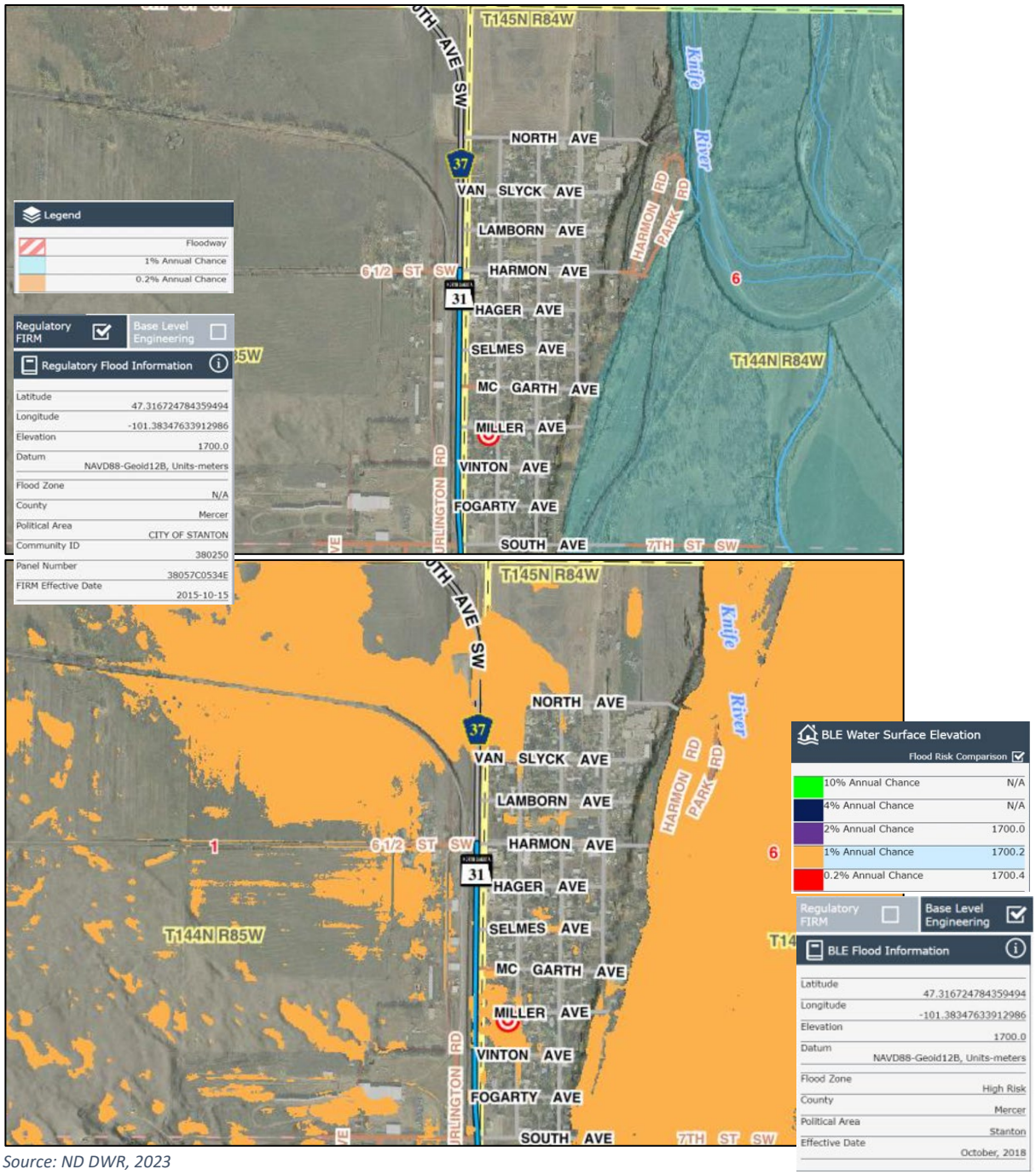
Figure 4.1-14: North Dakota Riverine Flood Events by County



Source: NRI, 2023

FEMA maps flood risk for communities across the nation. FEMA (2023) creates Flood Insurance Rate Maps (FIRM) and Flood Insurance Studies (FIS) under the National Flood Insurance Program (NFIP). Statewide base-level engineering can provide information about the location of floodplains and relative risk with aerial overlays. Results can be viewed with the example of Stanley in **Figure 4.1-15** and for the entire state at https://ndram.dwr.nd.gov/. The web tool was designed to be a universal resource for flood risk information, allowing users to map FIRM data. Base-level engineering can be useful for rural areas that have not had a detailed FIRM developed, like Stanley in the figure. The FIRM indicates a N/A flood zone, but the base-level engineering states the same location as an area of high risk. It also better visualizes areas where overland flooding occurs due to the flat topography, such as the area west and north of Stanley.

Figure 4.1-15: North Dakota Risk Assessment Map Service, Stanley

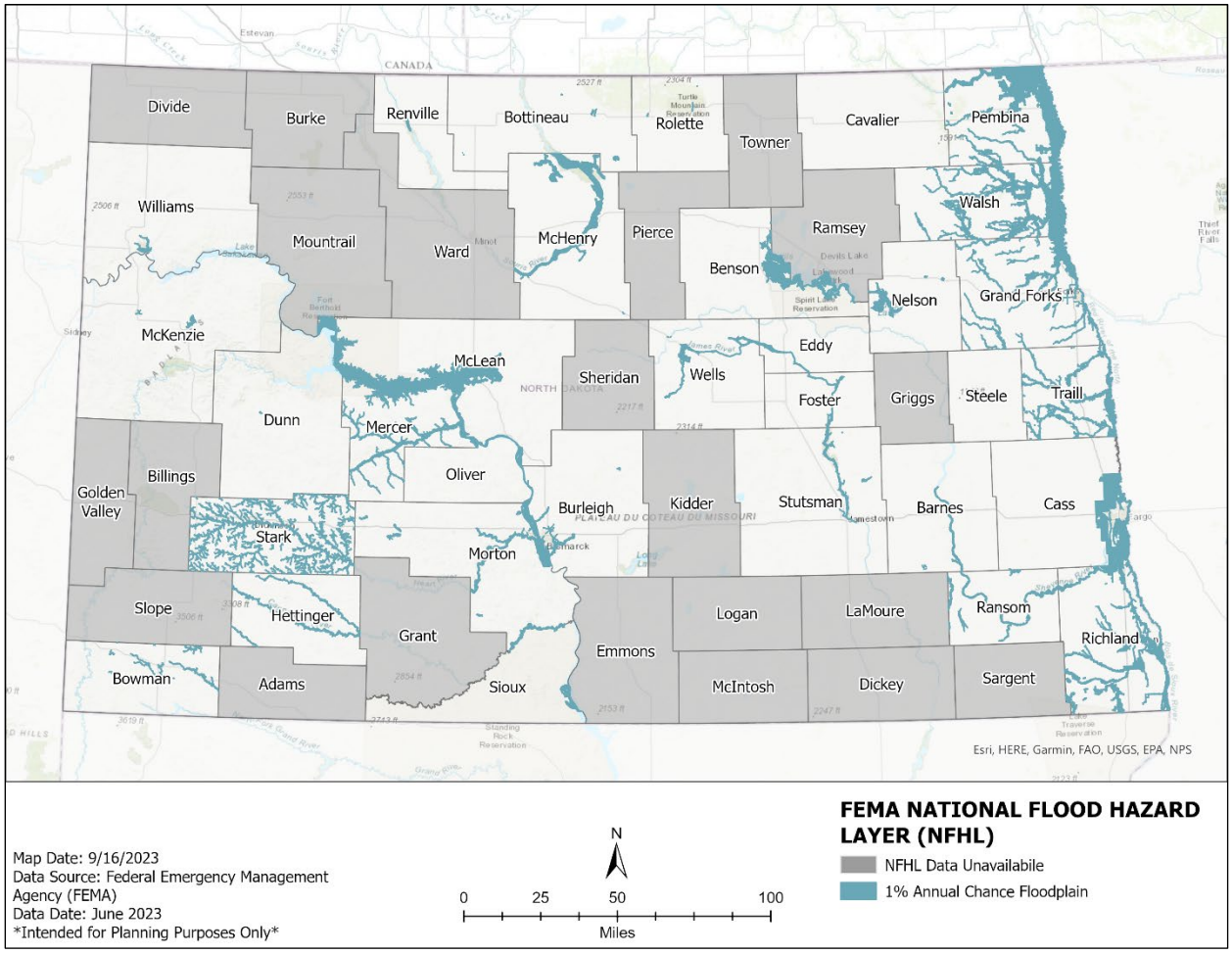


Source: ND DWR, 2023

FEMA floodplain maps developed for North Dakota communities focus on mapping the 100-year flood (the flood that has a 1 percent chance of happening each year) for riverine systems. Digital flood hazard mapping information is available with FEMA's National Flood Hazard Layer data (NFHL, 2023) viewer and geospatial dataset. The FEMA flood mapping data is available for more than half of North Dakota's

communities in digital format, as shown on **Figure 4.1-16**. Some jurisdictions within unmapped counties do have NFHL data, such as the City of Fargo in Cass County, and the City of Greene in Renville County. All five basins in North Dakota have counties that have not yet been mapped by FEMA as of 2021 or do not have digital flood risk mapping data available. This means that there are still riverine areas across North Dakota that need flood risk mapping information to describe the anticipated extent of impacts to property and people from flood events.

Figure 4.1-16: FEMA National Flood Hazard Data Availability by County in North Dakota



Source: NFHL, 2023

FEMA (2023) flood mapping data is also updated periodically, but updates take considerable time. The riverine flood risk shown on FEMA's FIRMs and FIS may not reflect current conditions, especially if a major flood event has occurred since the FEMA mapping information was last updated.

Historic stream gage data is an important aspect of hazard mitigation planning for flood events. By reviewing the historic gage heights for rivers, planning activities can better assess water levels and the potential for future flooding. The state of North Dakota and its local communities utilize USGS stream gage data (2023) to monitor major basins within the state. This data is also used to estimate flows using hydrologic engineering analysis methods for parts of the river system that do not have gages.

Figure 4.1-17 shows the percentage of time each of North Dakota's major tributaries spent in flood stages (minor, moderate, and major), between Water Years 2008-2023 and from Water Years 2018-

2023. Each of the gages saw an increase in the percentage of time the rivers spent in flood stage from WY2018 to 2023. The Red River and Missouri River both saw an increase in the percentage of time spent in major flood stage. A Water Year runs from October 1st of the preceding year through September 31st.

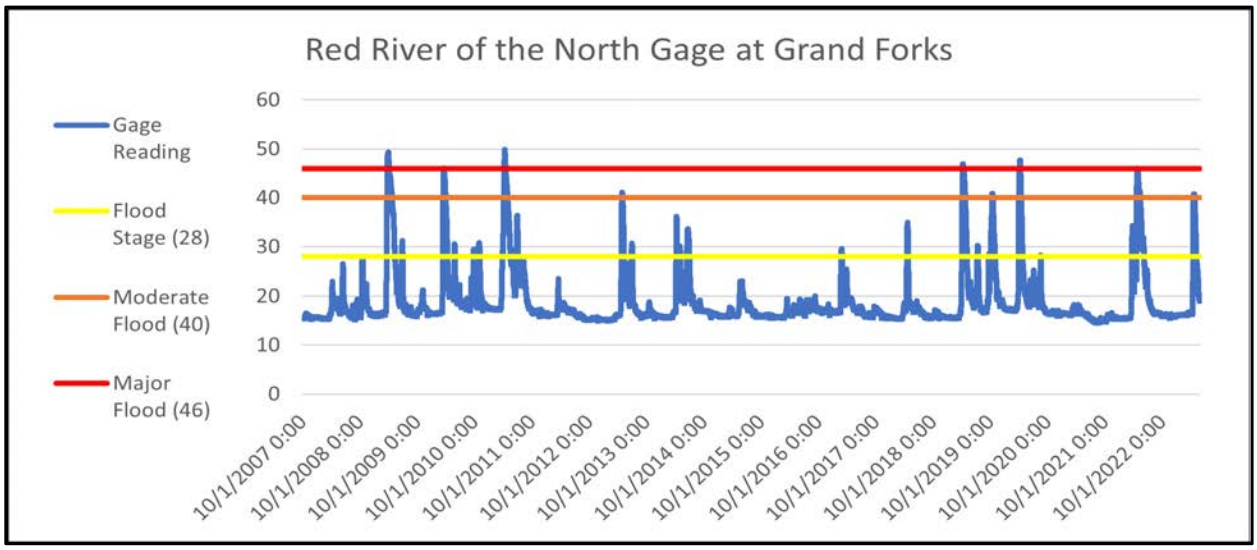
Figure 4.1-17: North Dakota Rivers in Flood Stages by Percent of Time Spent in Stage

River Gage	WY2008-2023			WY2018-2023		
	Minor	Moderate	Major	Minor	Moderate	Major
Red River at Grand Forks	7.1%	2.3%	0.5%	8.8%	2.7%	0.4%
Missouri River at Williston	6.5%	2.4%	0.7%	9.7%	3.8%	0.2%
James River at Jamestown	2.5%	0.4%	0.0%	1.1%	0.0%	0.0%
Mouse/Souris River at Minot	2.0%	1.6%	0.12%	0.0%	0.0 %	0.0%

Source: USGS, 2023

The Red River stream gage (**Figure 4.1-18**) is located on the downstream (north) side of the Sorlie Bridge (Demers Ave.) near downtown of Grand Forks. This stream gage has recorded the Red River reaching flood stage 25 times between WY2008 and 2023. At this gage location the Red River has reached or exceeded moderate flood stage 9 times, and major flood stage six times throughout those 15 years. The river water height exceeded major flood stage in 2009, 2010, 2011, 2019, 2020 and 2022. From WY2018 to 2023, the Red River at Grand Forks was in a flood stage nearly 9 percent of the time.

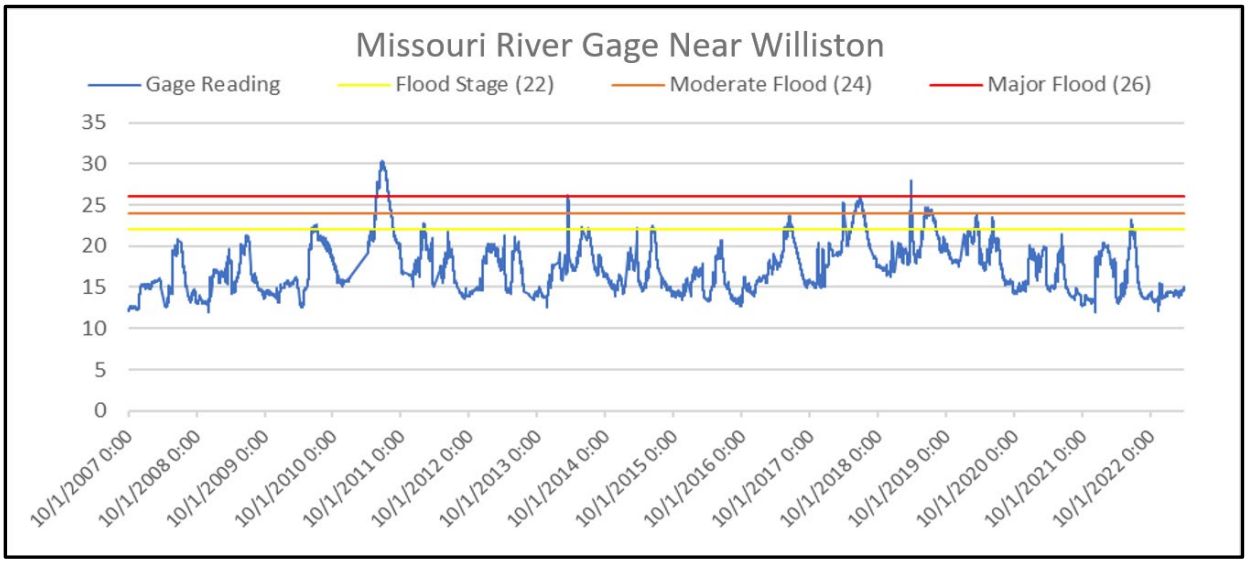
Figure 4.1-18: Red River Gage at Grand Forks WY2008-2023



Source: USGS, 2023

The Missouri River stream gage near Williston (**Figure 4.1-19**) has been in flood stage 22 times from 2009 through 2023. Spikes in water levels exceeding major flood stage occurred in 2011, 2014, 2018, and 2019. From WY2018 to 2023, the Missouri River Gage at Williston was in a flood stage 9.7 percent of the time, and in the major flood stage 0.2 percent of that time. Levels at this gage can be impacted by the operation of the upstream Fort Peck and Garrison Dams and the downstream Garrison Dam, affecting the overall extent of Lake Sakakawea. Sediment accumulation is anticipated to gradually exacerbate flood conditions over time.

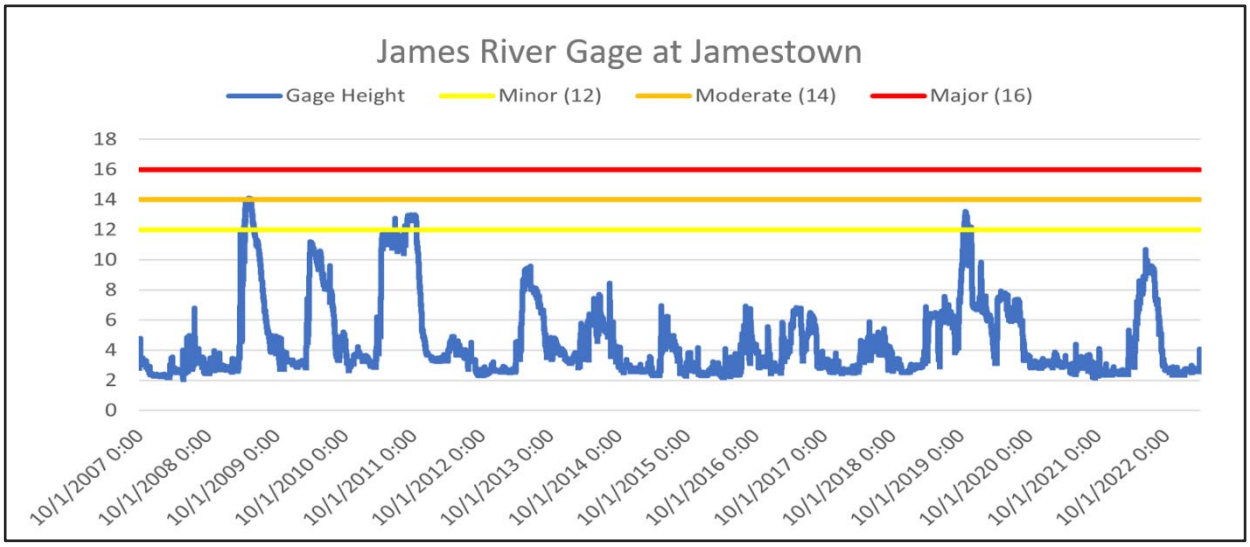
Figure 4.1-19: Missouri River Gage Near Williston, WY2008-2023



Source: USGS, 2023

The James River stream gage at Jamestown (**Figure 4.1-20**) has been in flood stage 8 times from WY2008 through 2023. However, this location has not reached major flood stage during those 16 years. Of the 8 flood periods only one reached moderate flood stage, that was in WY2009. This river gage site sits approximately 2 miles below (downstream from) the Jamestown Dam, on the James River, and roughly 5 linear miles below the Pipestem Dam, on the Pipestem River. The operations of these dams and the nearness of the gaging station keeps this gage from reaching flood stage more frequently.

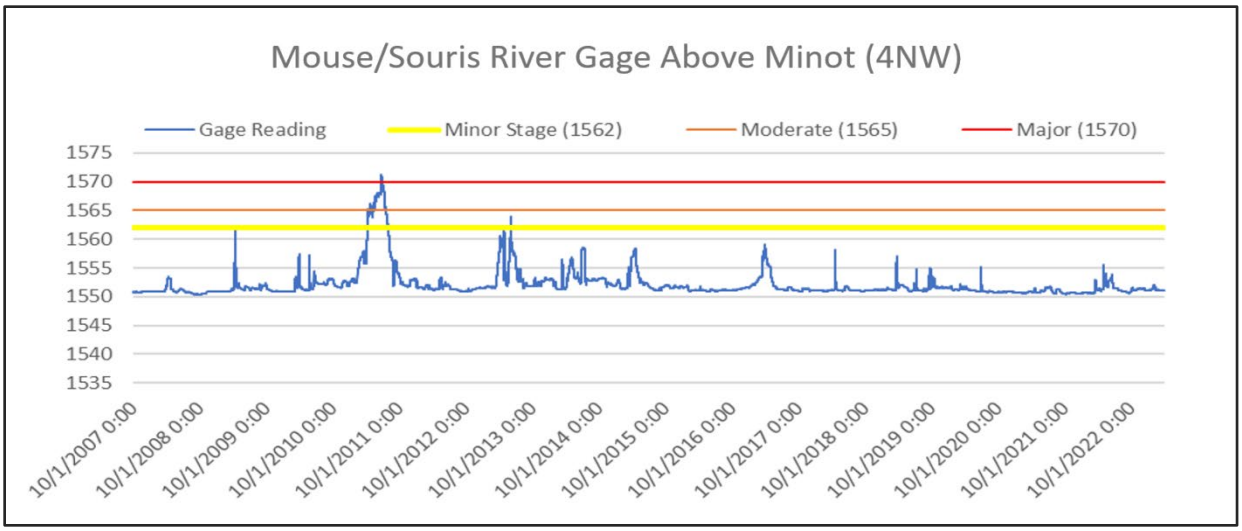
Figure 4.1-20: James River Gage at Jamestown, WY2008-2023



Source: USGS, 2023

The Mouse/Souris River stream gauge at Minot (**Figure 4.1-21**) was not in flood stage during the last plan update period. The stream gage at Minot had notable floods occurring in 2011 and 2013. Levels at this gage are influenced by the operations of Lake Darling Dam and dams further upstream in Canada.

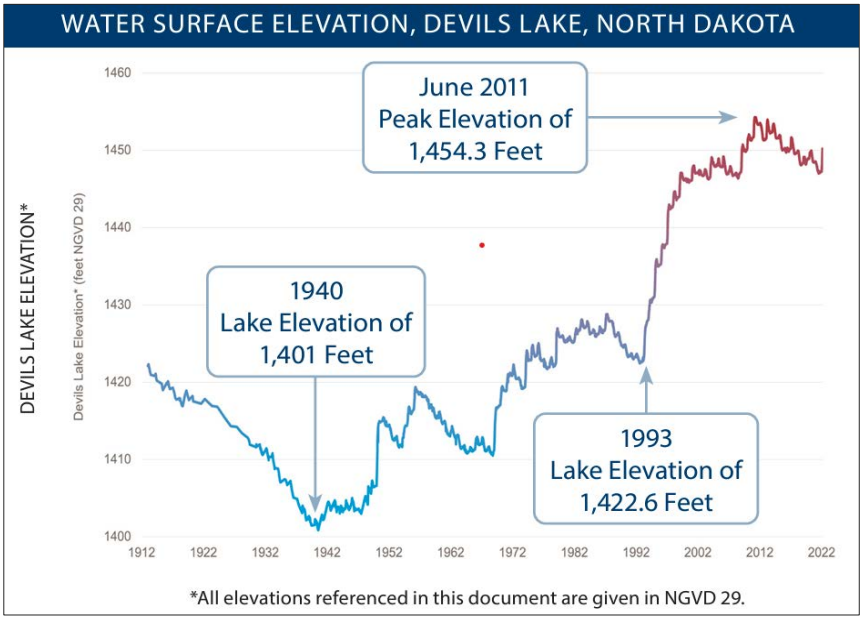
Figure 4.1-21: Mouse/Souris River Gage at Minot, WY2008-2023



Source: USGS, 2023

The Devils Lake "lake" gage is a special situation. Devils Lake is in an isolated basin and the lake's gage has been providing data about the lake water levels since 1912, as shown in **Figure 4.1-22**. Tracking the height of the lake is important for community safety as there are homes and critical infrastructure near the lake shore that have significant flood risk when water levels increase (ND DWR, 2023). Lake levels above 50 gage feet have the potential to impact the communities surrounding the lake. The ND DWR (2023) reports consistent upward trend in lake levels since 1993 has caused some communities to relocate as a form of flood hazard mitigation and prompted others to retrofit (elevate) or relocate critical facilities.

Figure 4.1-22: Devils Lake Gage Height, 1912-2022



Source: DWR, 2022

When these major rivers and a very large lake flood it can have regional impacts. Flood impacts on the seven resource categories shown in **Figure 4.1-23** occur regionally across the state of North Dakota. For example, the Red River months long spring flooding that occurred in 2022 had impacts on all these resource categories, as documented by KFYR TV (2022), that affected the eastern region of North Dakota.

Figure 4.1-23: Spatial Extent of Flood Impacts in North Dakota

Resource	Extent of Impacts
Public	Regional
First Responders	Regional
Delivery of Service and Continuity of Operations	Regional
Property, Facilities, and Infrastructure	Regional
Environment	Regional
State Economy	Regional
Public Confidence in the State's Governance	Regional

Source: USGS, 2023

4.1.1.4 Probability

Riverine flooding probability data is available from FEMA floodplain mapping information for North Dakota. FEMA's Flood Insurance Study and Flood Insurance Rate Map (FIRM) products provide data for the probability of flood events of different magnitudes occurring on specific riverine waterbodies throughout North Dakota. There are waterbodies in North Dakota that are unmapped by FEMA that have undefined flood risk, see Section 4.4.1.1.3.6 for more details. However, based on FEMA's data, 40 percent of flood insurance claims occur outside of mapped flood hazard areas. As such, it is reasonable to assume that there is flood risk in additional areas where detailed probability data is not yet available.

For other types of flood events, such as levee failure, high dam releases, and ice jams, detailed statistical data is not available, which prevents meaningful calculation of probabilities. However, the historical data in the tables shown below indicate that there is risk of these types of flood events occurring in North Dakota's communities. Analysis of the data in **Figure 4.1-24** shows that there is an average of 88 flood events each year. The type of event varies as does the flooding severity and impacts on lives, property, crops, and infrastructure.

For closed basins, the probability of flooding is directly tied to climate condition trends. Wetter weather trends over extended periods of time (years) significantly increase the probability of flooding in closed basin lakes. For example, there has been a consistent increase in wet weather in Devils Lake closed basin since 1993 (ND DWR, 2023). Lake levels have continuously risen since 1993 and it is not possible to calculate the number of distinct events.

Figure 4.1-24: Impact of Flood Events 1996-2022

Cause	Events	Deaths	Injuries	Prop. Damage	Crop Damage	Other Impacts
Heavy Rain/Snow Melt	897	8	2	$ 339,102,000	$ 97,592,000	Road Closures and damage, Critical Infrastructure failure/damage, Evacuations
Riverine	232	4	5	$ 3,579,415,000	$ 57,000,000	
Ice Jam	19	0	0	$ 4,351,000	$ 45,000	
Dam / Levee Break	1	0	0	$ 1,000	$ -	
Planned Dam Release	3	0	0	$ 6,300,000	$ -	
Grand Total	1,152	12	7	$ 3,929,169,000	$ 154,637,000	

Source: NCEI, 2023

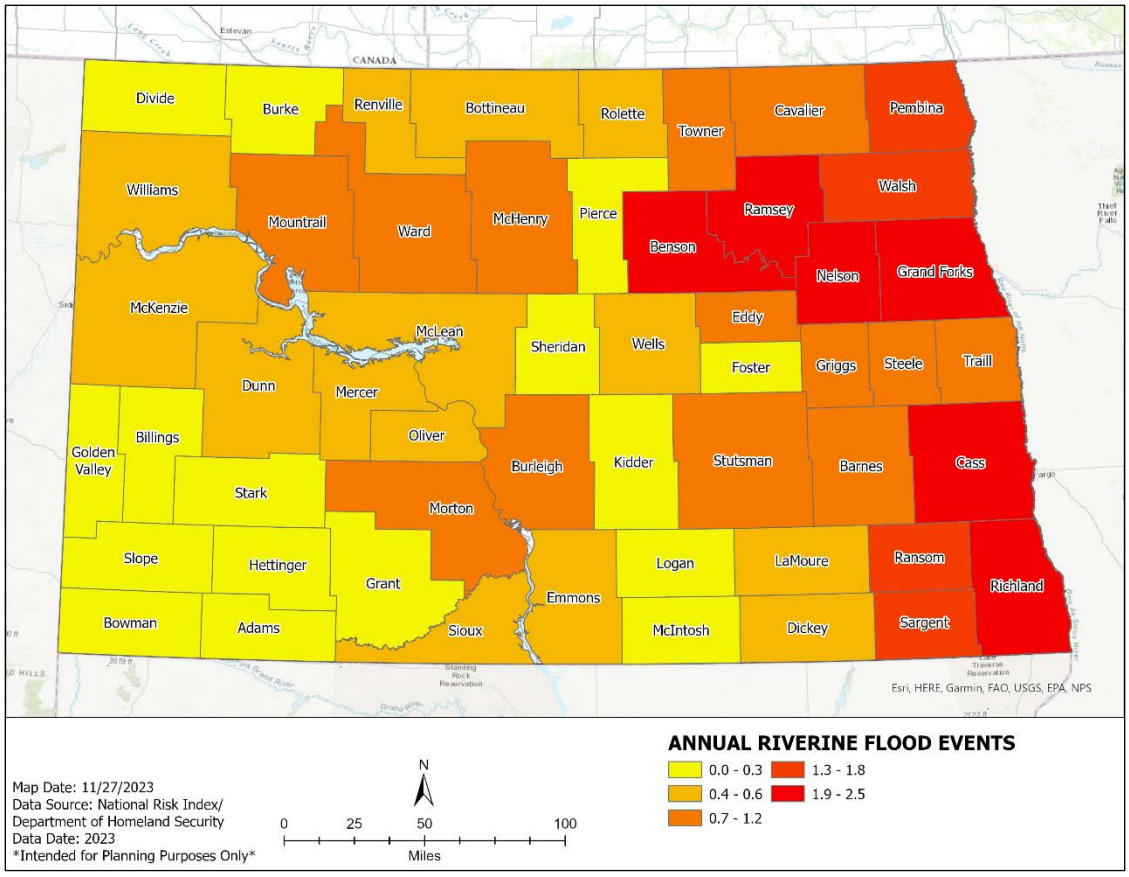
Figure 4.1-25: Billion-Dollar Floods that Include North Dakota

Flood	Dates	Deaths	CPI-Adjusted Cost (Millions)	Other Areas Impacted
Midwest Flooding	June 27, 1993-August 15, 1993	48	$ 44,437.2	Central and Midwestern States
Northern Plains Flooding	February 3, 1997-May 24, 1997	11	$ 6,948.5	MN, SD
Missouri River Flooding	May 1, 2011- June 30, 2011	5	$ 2,743.1	Missouri and Mouse/Souris River Systems (IA, KS, MO, MT, NE, SD)
Missouri River and North Central Flooding	March 14, 2019-March 31, 2019	3	$ 12,872.4	IA, MI, MN, MO, NE, SD, WI

Source: NCEI, 2023

Ten counties in eastern North Dakota experience at least one flood event each year as shown in **Figure 4.1-26**. These counties primarily fall within the Red River Basin.

Figure 4.1-26: Number of Riverine Flood Events Annually by North Dakota County



Source: NRI, 2023

4.1.1.5 Warning Time and Duration

Having advanced warning that flooding is likely to occur or is imminent helps save lives and prevent damage to property and infrastructure. Given adequate warning, affected areas can be evacuated and flood fighting activities can occur that may prevent damage and avoid loss of life.

United States Geological Survey (USGS, 2023) riverine flood gage data and National Weather Service (NWS, 2023) flood warnings and watches provide a critical riverine flood event warning service, in addition to state and individual community flood warning alert systems. The State of North Dakota Department of Water Resources (ND DWR, 2023) has the ND Risk Assessment Map Service that provides real-time flood risk information online. For other types of flooding, the risk monitoring systems and typical amount of warning time varies by local community.

High dam releases are intentional releases so notice can be given; however, it may be short notice, as the need to make the release can occur within a short time span. Levee failures, ice jam breaks, and flash floods generally occur with little warning. This increases the likelihood of loss of life and damage to property, industry, infrastructure, and crops in affected areas from flash floods.

The duration of flooding can also impact the amount of damage experienced from a flood event. The longer a flood event lasts the higher the likelihood for damage to infrastructure and structures, according to FEMA and NOAA (2023). The longer a structure is inundated by flood waters the greater the likelihood of damage. There is an increased risk that water will seep into the structure, impact wood and finishings within the structure, and crack foundations or damage the support structure due to the continued pressure standing water puts on them. The durations of flood events vary across ND. For closed basins like Devils Lake Basin that are experiencing increased precipitation trends, rises in water levels may last for an extended period in comparison to the extremely short duration of flash floods.

4.1.2 Consequence and Vulnerability Loss Analysis

This section describes the consequences and state and local vulnerabilities of flooding. Both consequences and vulnerabilities are defined as follows in the context of this resource:

- **Consequence**: is the “degree of debilitating impact that would be caused by the incapacity or destruction of critical infrastructure or a critical function” (FEMA EMI, 2023, p. 1564). Consequences can be tangible impacts to buildings or systems or intangible impacts on processes, business, or reputation. Consequences include the debilitating impacts, such as the loss of critical functions, data, or the public. It also includes cascading effects that may affect functionality of critical services such as the loss of service of a utility or communications.
- **Vulnerability**: “is susceptibility to physical injury, harm, damage, or economic loss. It considers the extent of injury and damages that may result from a hazard event of a given intensity in a given area” (FEMA EMI, 2023, p. 104). This may be a geographic, social, or economic feature that makes harm from a hazard more likely or more intense.

4.1.2.1 Human Loss

According to FEMA (2023), consequences of floods include human loss of life and injury. Flood fatalities in North Dakota from 2010 to 2023 as recorded by the National Weather Service (NWS) are detailed in **Figure 4.1-27** (NWS, 2023). A total of 10 people lost their lives due to floods during this 13-year timeframe. That's an average of less than 1 fatality a year due to flooding (NWS, 2023).

Figure 4.1-27: North Dakota Flood Fatalities by Year

Year	Fatalities
2023	1
2022	2
2021	0
2020	0
2019	2
2018	0
2017	0
2016	0
2015	0
2014	0
2013	3
2012	0
2011	2
2010	0

Source: NWS, 2023

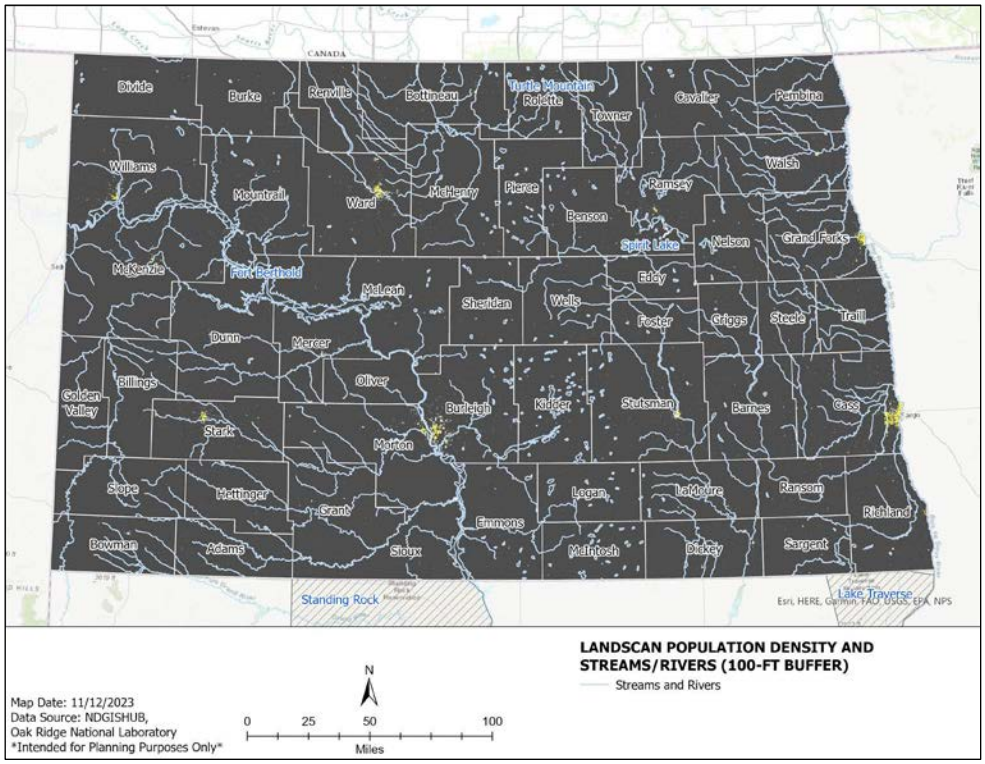
Floods can also cause non-fatal injuries and mental health impacts. Flood events can have a significant emotional and mental health toll on individuals that experience them. According to the National Library of Medicine's National Center for Biotechnology Information, "there is increasing evidence that flood events affect the mental health of those experiencing them" (Butler, Walker-Springett, Adger, 2018, p. 1). The Center's studies have also found that institutional actions and support are needed to help limit the negative effects of flooding on the mental health of those impacted (Butler, 2018). According to FEMA's Crisis Counseling Assistance and Training Program (2023) information), the most vulnerable survivors after a disaster are those already suffering from depression, extreme stress, substance addiction, or mental health challenges and individuals that are isolated without a support network. FEMA (2020) indicates in their fact sheet for helping children cope with a disaster, that children are particularly vulnerable to stress that follows a disaster and their symptoms may linger much longer than adults. Children comprise two-thirds or more of the population in 10 North Dakota communities, and they may need more state mental health resources in the event of a damaging flood. Most are in western North Dakota: Mont Township (Williams County), Minnesota Township (Burke County), Crane Creek Township (Mountrail County), Oliver Township (Williams County), Ness Township (Pierce County), Ellisville Township (Williams County), Maine Township (Adams County), Egan Township, (Mountrail County), Oak Valley Township (Bottineau County), Yorktown Township (Dickey County), and Mountrail Township (Mountrail County). Each of these are communities where flood risk has been identified (Census, 2023).

Locations where there are large numbers of people without cars may need more resources and assistance to evacuate. There are four communities in the state where there are more than three-quarters of the population without access to a vehicle (Census, 2023). Holden Township (Adams County), Fairdale Township (Walsh County), Deep River Township (McHenry County) and Andrews Township (McLean County). Holden Township includes Willow Creek. Fairdale Township has wetlands and overland flooding risks while lacking building codes and has more than 30 percent of its population over 65 years of age (Walsh County Multi-Hazard Mitigation Plan, 2021). Deep River Township is a tributary to the Mouse/Souris and has overland flooding concerns. Andrews Township includes numerous small creeks which could be a source of flooding.

Benson County (2018) has identified risks related to Devils Lake, where the elevation of property in lakeside communities is critical. Should the lake reach 1,465msl, all the critical facilities in the community of Minnewaukan could be impacted. The town has partially relocated structures as the lake has expanded in recent years.

Figure 4.1-28 shows LandScan (Weber, et al., 2022) population density and 100-foot buffers for waterways. All of North Dakota's major cities are along waterways as are many of the smaller rural population centers.

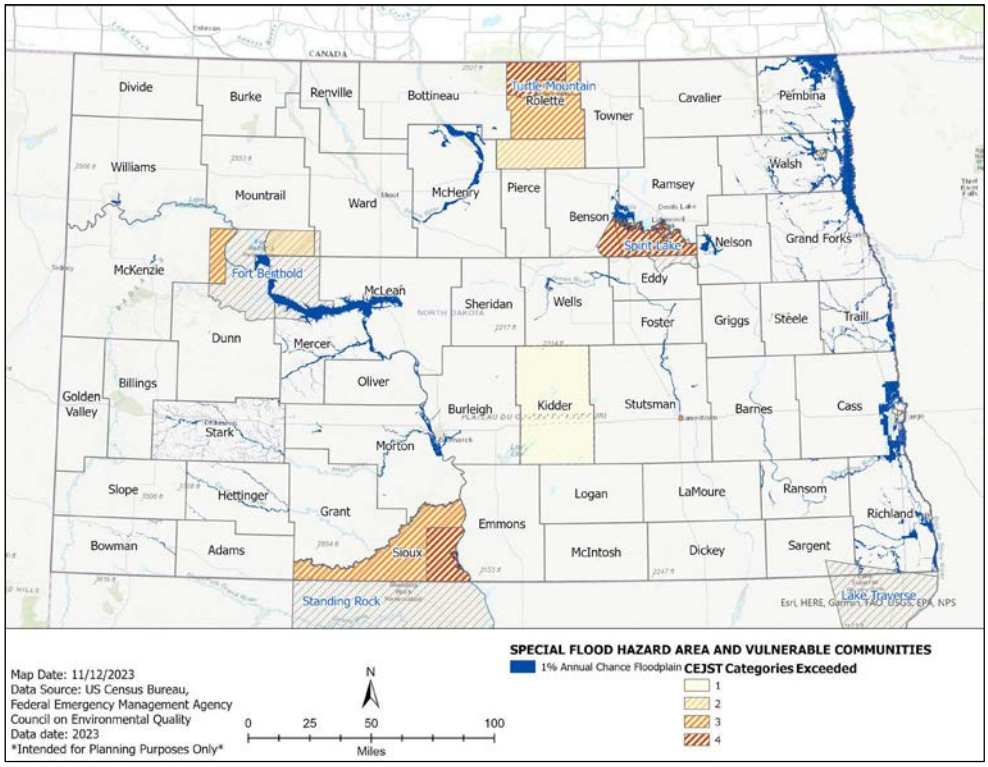
Figure 4.1-28: LandScan Population Density and Waterways



Source: Weber, 2022; NDGIS, 2023

Figure 4.1-29 shows the areas of CEJST category exceedance (US Council on Environmental Quality, 2022) and the Special Flood Hazard Area (SFHA) (FEMA, 2023) in the state. There is significant overlap between these areas and large areas of SFHA along the Red River, Missouri River and reservoirs, and Devils Lake. CEJST exceedance areas represent areas where social vulnerability is high, and environmental burdens are high, and where resources may not be readily available in the community to recover from flood damages, or to evacuate easily. These areas include Grafton and areas of Fargo, where there is a substantial portion of population which speaks English as a second language. And areas near Devils Lake and along the Missouri River where tribal jurisdictional and poverty barriers may provide barriers to addressing mitigation needs. Additional outreach and state and local resources may be needed to protect people in these areas from the dangers of flooding and to assist in flood recovery efforts. Conversely, additional FEMA assistance may be available for mitigation endeavors in these areas.

Figure 4.1-29: North Dakota CEJST Exceedance Areas and SFHA



Source: CEQ, 2022

4.1.2.2 First Responders

Flooding event consequences include impacts to first responders. Floods require them to be deployed to help with door-to-door notification, traffic management, resident evacuation, and swift water rescues. Flood events range in magnitude and can impact more than one jurisdiction at the same time. Local and state first responders are often stretched thin across regions and the state during flood events. Flood events impact infrastructure including transportation routes and communication lines. This can further hamper first responders' ability to respond effectively and reach areas with limited access due to flood waters. Flood events also involve swiftly moving water that carries debris. First responders are tasked with evacuating and rescuing residents from these flood waters during flood events at significant peril to themselves, including the possibility of injury or death.

The vulnerabilities include flash floods, ice jam breaks, and/or dam or levee breaches or overtopping. These flood events present significant challenges for first responders, as they occur with little notice and

> Closed basin flooding is unique when compared to standard riverine flooding because river levels tend to rise rapidly and the flood has a duration of days to weeks, whereas closed basin flooding like Devils Lake occurs relatively slowly and lasts for years or indefinitely. The flood problems are compounded by wave action and ice movement on the lake.
>
> *(Benson County Multi-Jurisdictional Hazard Mitigation Plan, 2018)*

may require first responder resources to be mobilized quickly. These situations can easily overwhelm local and regional first responders.

4.1.2.3 Environmental, Natural, and Cultural Resources

Floods are an important part of the health of rivers and streams, but they can have negative consequences when they cause significant sedimentation, erosion, and contamination. Flood waters inundate land surrounding streams and rivers, and any chemicals or toxins present in the soil or built environment may be released into flood waters. According to the Centers for Disease Control (CDC), "Floods and other disasters can damage drinking water wells and lead to aquifer and well contamination (CDC, 2023, p.1). Floodwaters can contaminate well water with livestock waste, human sewage, chemicals, and other contaminants that can lead to illness when used for drinking, bathing, and other hygiene activities" (CDC, 2023, p. 1). For example, if agricultural fields are adjacent to waterways, then phosphorus or nitrogen used in fertilizers may be released into the watercourse. Similarly, construction sites and mining operations contain toxic materials that can be released into a watercourse during a flood, negatively impacting water quality and the health of fish and aquatic species.

According to the USGS (2023), flooding frequently causes stream bank erosion and sediment transport (USGS, 2023). The US Environmental Protection Agency (EPA) states that "stream bank erosion can lead to bank instability and increased sediment loading downstream. This increased sediment load may cause water quality degradation, negatively impacting fish, benthic invertebrates, and other aquatic life in the stream. Channel instability and loss of instream structures, such as the loss of pool and riffle sequences, also resulted from increased stream flows leading to degraded habitat for aquatic life" (Selvakumar, Struck, et al., 2007, p. 2). Areas that have experienced wildfires near or adjacent to waterways also have an increased vulnerability to sediment transport and contamination due to flooding. The aquatic species in these areas are especially vulnerable.

Animals, including wildlife and those on farms, can be at risk of drowning due to lack of access to high ground during a flood event, and may also be left without food and feed according to FEMA (FEMA, 2023). For example, **Figure 4.1-30** shows a group of wild turkeys that were displaced by flood waters and forced to gather next to the downtown library in Fargo when the Red River rose to flood stage (38.7') in April 2011 (NDSU, 2011).

Figure 4.1-30: Wild turkeys displaced by flood water.

Source: Schwert, NDSU, 2011. Reprinted with permission.

Cultural resources such as historic buildings and sites in areas adjacent to waterways are also especially vulnerable to flood impacts. For example, the Fort Totten site and its structures (**Figure 4.1-31**) are historically significant and at risk of damage from riverine flooding (State Historical Society of North Dakota, 2023), due to the site's location near Devils Lake. The lake is a closed basin lake with rising water levels.

Figure 4.1-31: Historic Fort Totten Site

Source: State Historical Society of ND

Significant channel migration can also occur during a flood event when floodwaters cause erosion and sediment is transported and deposited in new locations. Floods have historically changed the natural environment and hydrology of affected areas across North Dakota. Channel migration and erosion can cut into cultural sites exposing sensitive items and causing destruction.

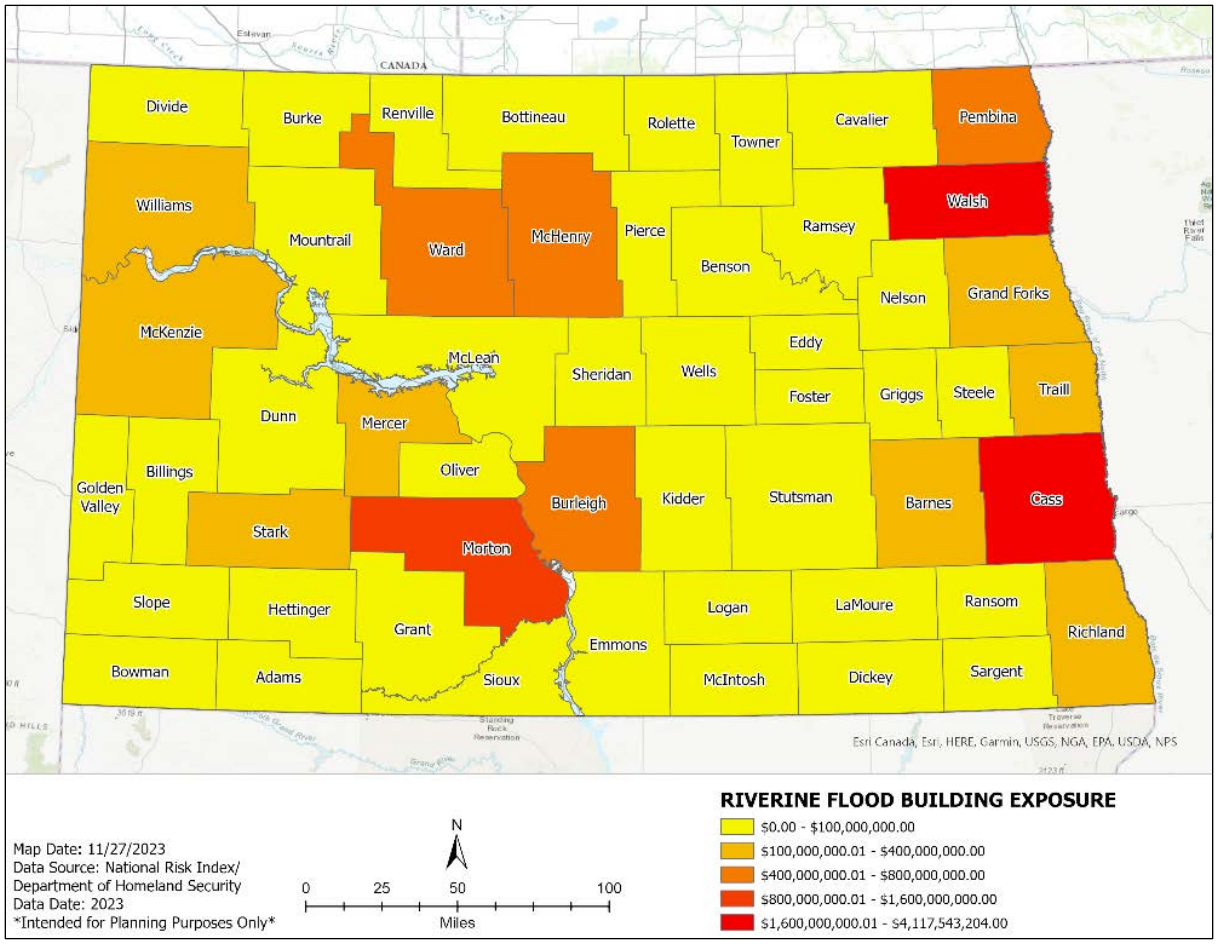
However, according to the FEMA and the Association of State Floodplain Managers in their Green Guide (2023), when floodplains (areas adjacent to watercourses) are maintained in their natural state there can be ecological benefits as they are naturally designed to distribute floodwaters in a manner that protect fish and wildlife habitat, recharge groundwater, and improve biological productivity. They can also store floodwaters and help protect built environment (developed) areas by reducing their flood risk.

4.1.2.4 Property, Facilities, and Infrastructure Damage

A major consequence of flooding is damage to property, facilities, and infrastructure. Buildings are damaged due to floodwater movement and pressure. FEMA's Flood Hazard Mitigation Handbook for Public Facilities (2001) states that buildings are damaged by flooding due to hydrostatic, hydrodynamic, and buoyancy forces. Standing water or slowly moving water can cause damage to structures, by exerting hydrostatic force (pressure) that can cause structural damage and collapse. Fast moving water and debris exerts hydrodynamic force (pressure) against a building which can also cause structural damage and collapse. According to FEMA's glossary of terms (2023) when flood waters flow around or against a building they exert "positive frontal pressure, drag effects along the [buildings] sides, and negative pressure in the downstream side" (FEMA, 2023, p.1). What this means is, the flowing water and debris it carries can cause significant damage to buildings. Buoyancy is another force exerted by floodwaters that puts upward pressure on buildings and can cause them to float.

Buildings across North Dakota have been significantly impacted by flooding. **Figure 4.1-32** shows building exposure to riverine flooding by county (National Risk Index, 2023) for the entire state. In North Dakota, seven counties have more than $800 million dollars of building exposure (structures at risk of flooding) including Burleigh, Cass, McHenry, Morton, Pembina, Walsh, and Ward counties.

Figure 4.1-32: North Dakota Building Riverine Flood Risk Exposure



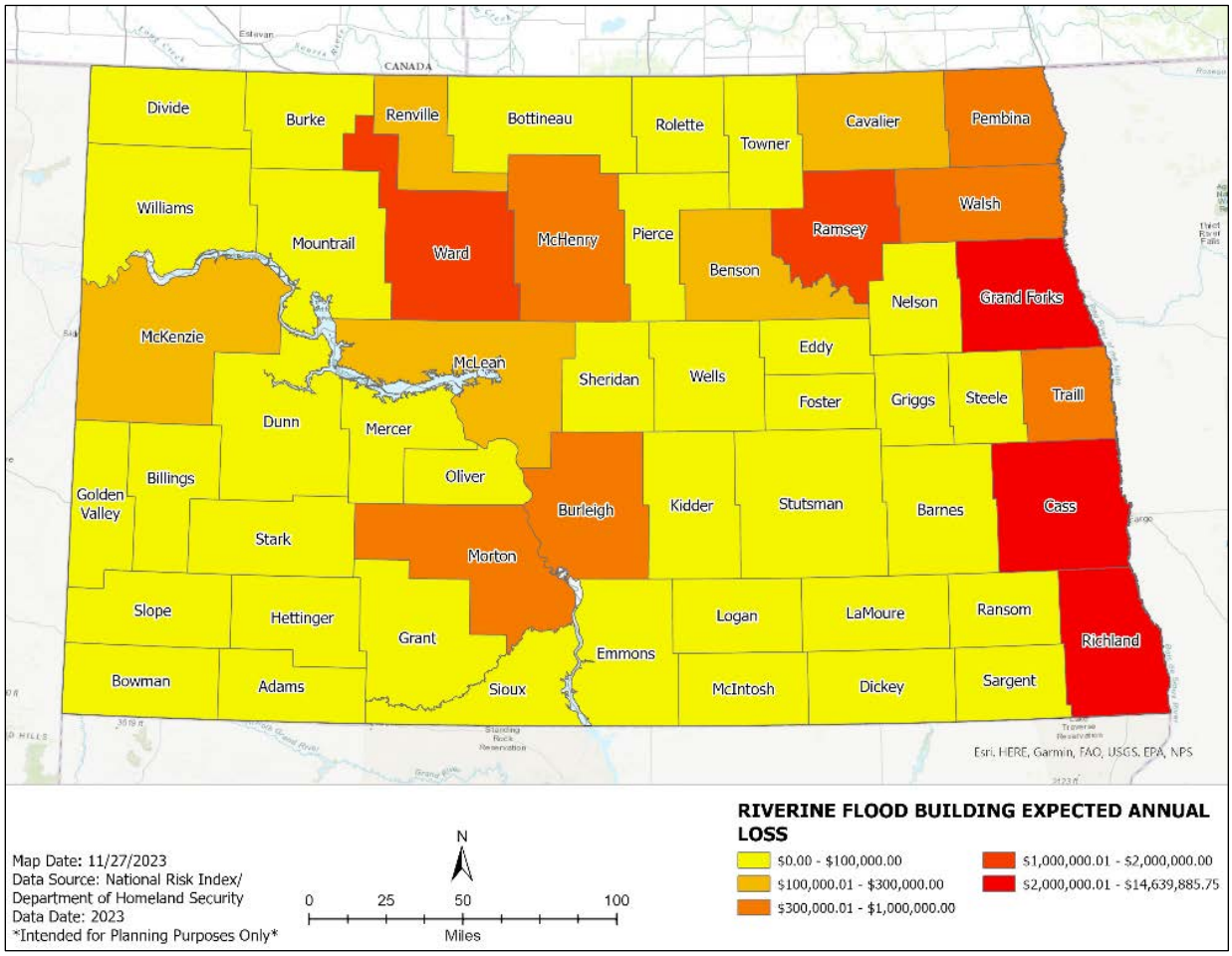
Source: NRI, 2023

These counties and an additional four counties have the higher estimated annual building losses due to flood damage (NRI, 2023), as shown on **Figure 4.1-33**. These counties have estimates of between $1 million to $14 million in building losses. Buildings that are in low-lying floodplain areas are the most vulnerable to flooding impacts.

The main lift station for the City of Rugby is located on the edge/within the 100-year flood boundary. Failure of this lift station would result in sewage contamination of the Wentz Canal, which connects to the Mouse/Souris River at Towner in neighboring McHenry County. If power were lost to the city's main lift station, there would be approximately an hour timeframe before sewage would back-up into homes of city residents.

(Pierce County Multi-Jurisdictional Hazard Mitigation Plan, 2018)

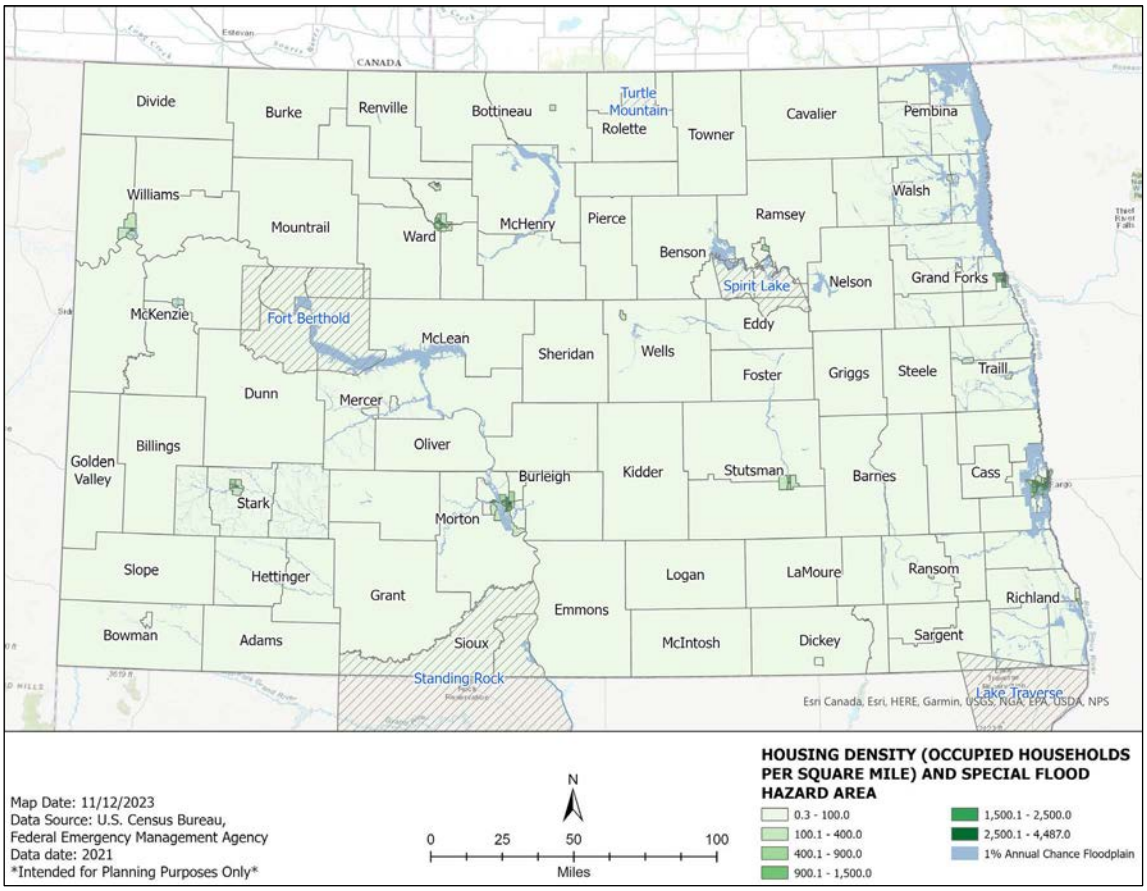
Figure 4.1-33: Anticipated Annual Building Losses Due to Flood Damage



Source: NRI, 2023

Figure 4.1-34 shows housing density (American Community Survey, 2021) and the SFHA (FEMA, 2023). Areas of the state with high housing density are typically along rivers, thus making much of the private property in the state in areas subject to inundation and keeps the potential damages from floods high.

Figure 4.1-34: North Dakota Housing Density and SFHA



Sources: US Census, 2023

Mobile homes and other housing units that lack a foundation can be seriously damaged beyond repair by floodwaters. The state has 16 communities that have 100 percent of their housing units identified in the Census as mobile homes, shown in Appendix D.8, and 280 in which at least 1 in 5 housing units are mobile homes. Communities with 100 percent of their housing units as mobile homes are located in the following counties: Bottineau, Bowman, Divide, Kidder, McHenry, McKenzie, Mountrail, Ransom, Renville, Towner, Wells, and Williams. The counties of Kidder, Mountrail, Renville, and Williams have two communities with 100 percent of housing units as mobile homes. While the risk of flooding for these areas varies as shown in **Figures 4.1-26**, **4.1-32** and **4.1-33**, a flood in these communities could create a significant demand for short-term housing. Additionally, **Figure 4.1-29** shows an overlay of SFHA areas throughout the state where there is also high social vulnerability, juxtaposing vulnerable populations with flood risk. While this map is not bound by county lines, but rather along bodies of water, it provides a comparison where social vulnerability is high along with flood risk. Communities such as Ardoch in Walsh County, which lies not far from tributaries to the Red River and has 80 percent

of its housing as mobile homes, and Odessa Township along Devils Lake with 68 percent of its housing as mobile homes, would be particularly at risk from this vulnerability (American Community Survey, 2022).

Flooding also has negative impacts on drinking water wells. One consequence of flooding is that drinking water supplies are often damaged and unsafe for use. According to the CDC (2023), "floods and other disasters can damage drinking water wells and lead to aquifer and well contamination" (CDC, 2023, p.1). Some of the contaminants that can enter drinking water wells and aquifers from flood waters include human sewage, livestock waste, and chemical toxins. The CDC (2023) notes that these contaminants can cause illness and people may be exposed to them when they drink, bathe, or use well and aquifer water that has been exposed to contamination due to flooding. Drinking wells in floodplain areas that have contamination sources (ag lands, industrial lands, etc.) are the most vulnerable to negative impacts from floodwater contamination.

Drinking water transport lines that are attached to bridges or buried in areas susceptible to flood erosion are also vulnerable to flood damage. Scouring caused by flooding can cause water lines to be exposed and to rupture. Debris in floodwaters can also impact water lines exposed beneath bridges. Other utilities impacted by flooding include sewage and power lines. According to the USGS (2023), floods cause erosion and scouring; both of which can cause utility pipes and lines to be exposed, rupture, or be damaged by floodwater and debris.

One of the most common consequences of flooding is road closures and transportation system impacts. According to FEMA's Flood Hazard Mitigation Handbook for Public Facilities (2001), roads are the most commonly damaged facility in a flood event. Flooding causes damage to roads including erosion of road surfaces, embankment slopes, shoulders, and other structural features.

Sections of the North Dakota transportation road network that are below FEMA mapped flood elevations are particularly vulnerable to flooding impacts. **Figure 4.1-35** is a photo of Elm Street in Fargo (NDSU, 2011) flooded by the Red River when it reached a water elevation of 25.7' on April 4, 2011.

Figure 4.1-35: Elm Street in Fargo closed due to flooding.

Source: Schwert, NDSU, 2011. Reprinted with permission.

One of the most important roadways vulnerable to flooding in ND is Interstate 29 (I-29). According to the Valley News (2023), I-29 continues to have flooding issues and was closed as recently as June 2023 due to flooding. NDDOT and its partners are working to raise road elevations to address this vulnerability. One example of this is the partnership work currently being done by the USACE along with the Metro Flood Diversion Authority and NDDOT to raise I-29 above the 500-year (0.2% annual-chance-flood) flood elevation to prevent impacts from flooding. Members of the public have also frequently captured images of I-29 being impacted by flooding and posted them on YouTube as shown in **Figure 4.1-36**.

Figure 4.1-36: Interstate 29 near MP160, Inundated by Floodwaters.

Source: NDDOT, YouTube, 2020

FEMA's Flood hazard Mitigation Handbook for Public Facilities (2001) also notes that flooding causes damage to public infrastructure such as drainage ditches and culverts. Per FEMA (2001), flooding can cause partial or full washout of culverts and damage to culverts due to debris impacts and erosion of culvert entrances and outlets. Culverts with inadequate debris protection measures and undersized culverts are the most vulnerable to flooding impacts. For example, Dunn County economic activity was halted and is currently slowed due to spring floods as they await new culverts for oilfield activity.

4.1.2.5 Critical Facilities, Community Lifelines, and State Assets

Critical facilities, community lifelines, and state assets face many of the same risks from flooding as private property. Floods threaten all seven of the Community Lifelines: Safety and Security, Food, Water, and Shelter, Health and Medical, Energy (Power and Fuel), Communications, Transportation, and Hazardous Materials.

- **Safety and Security:** Flood responses are demanding for police, fire, and EMS services, which are called on to notify, evacuate, and rescue residents. Flood fighting to protect critical and non-critical structures and infrastructure can also require large amounts of volunteers and resources. Transportation impacts can cause issues with first responders and volunteers accessing those in need. Floods threaten community safety and can directly cause injury, mental health issues, and loss of life.
- **Food, Water, and Shelter:** Floods can destroy crops and topsoil, kill livestock, and disrupt agricultural operations. Floods can also contaminate drinking water wells and aquifers and impact access to clean water for drinking, bathing, and cooking. Floods destroy homes and other

structures and can leave the public in need of emergency shelters and long-term accommodations.

- **Health and Medical:** Flood water contamination of drinking water sources can lead to illness. Hospitals and other medical facilities can be impacted by floodwaters. EMS access to those in need of assistance can be severely hampered or compromised by flood waters. Floodwater can directly threaten critical healthcare facilities.
- **Energy (Power and Fuel):** Floods can damage power infrastructure, including power stations and power lines. Floods may also damage fuel lines, flood gas stations and fuel delivery systems, and impact oil and gas production operations and facilities.
- **Communications:** Floods can cause damage to communication infrastructure including power lines. Telecommunication systems may be compromised. 911 systems may be overwhelmed with calls for help during a flood if residents need to be rescued and evacuated.

The Hettinger County Courthouse and the city shop for the city of Mott are in areas vulnerable to impacts from flooding.

(Hettinger County Multi-Jurisdictional Hazard Mitigation Plan, 2019)

- **Transportation**: Roadways can be blocked and destroyed by floodwaters that can wash away cars and other vehicles, damage bridges, and destroy transportation infrastructure. Drivers often enter floodwaters without realizing the danger and may be at risk of drowning if their vehicle is stuck or washed away by flood waters.
- **Hazardous Materials:** Floods can cause contaminants and toxic materials like agricultural pesticides to spread into waterways, soil, drinking water sources, and the environment in general. Floods can lead to oil, gas, and other toxic chemical leaks when storage and production facilities are impacted. This creates additional environmental concerns and requires additional resources with specialty training to manage flood clean-up and recovery processes.

Critical facilities, community lifelines, and state assets located in high-risk flood areas are the most vulnerable to flooding impacts. **Figure 4.1-37** shows the number of critical facilities within high-risk flood hazard areas across the state. Electric transmission substations and childcare centers are the most common critical facilities in the 100-year (1 percent annual chance) flood zone. Public schools, electric transmission substations, and local Emergency Operations Centers (EOC) are the most common critical facilities in the 500-year flood zone. Overall, there are 87 critical facilities in high-risk flood hazard areas and another 2,266 critical facilities in areas with mapped flood risk, and 305 critical facilities protected by levees with levee failure risk.

Because so much of the state is flat, and developed areas are typically in river valleys, much of the development in the state, including state assets, are at risk of flooding or at risk of having access disrupted from flooding. According to Clayton (1997), during the 1997 flood, arrestees in the county were transferred to Minot, and many of the 78 inmates were transferred. The use of minimum-security or work-release labor to combat floods is typical in large events. The 2011 flood resulted in the evacuation of inmates (Dickinson Press, 2011) from the Missouri River Correctional Center in Bismarck to the youth facility in Mandan.

According to Skurzewski (2021), when Minot was hit with devastating floods in 2011, the State Fair had to be canceled as the only dry spot on the property was the command center (established in a parking lot) and workers, many of whom had flooded homes, worked long hours to save the state facilities.

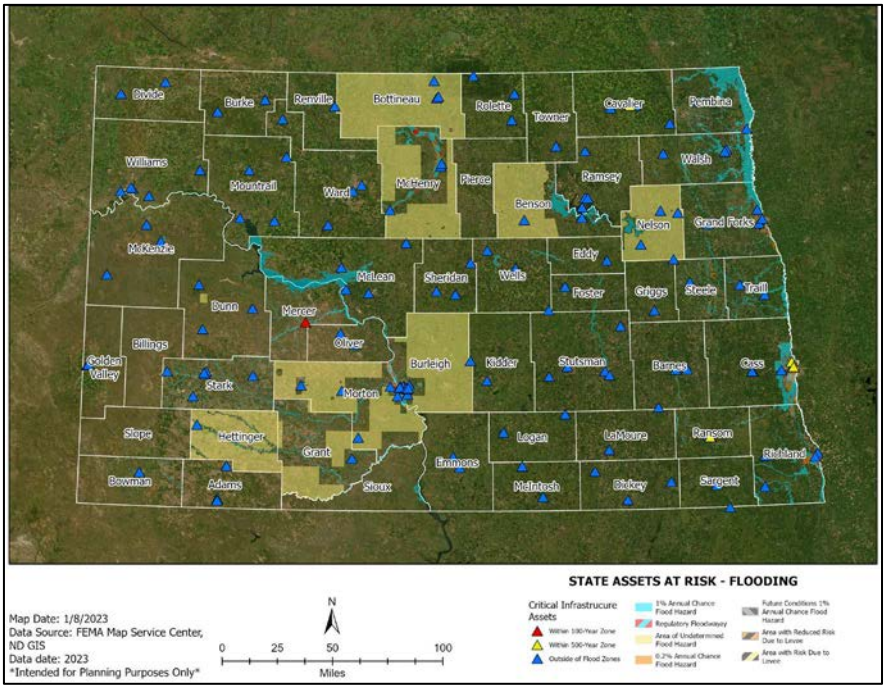
Figure 4.1-37: North Dakota Critical Facilities in Flood Hazard Risk Areas

Critical Facility Type	Number of Facilities in 100-Year Flood Zone *(1% annual-chance-flood zone)*	Number of Facilities in 500-Year Flood Zone *(.2% annual-chance-flood zone)*	Total Insured Amount
Government	2	6	$81,898,906.00
Agriculture	0	0	0
Communications	0	0	0
Chemical	0	0	0
Banking/Finance	0	0	0
Emergency Services	0	0	0
Water	0	0	0

Source: NFHL data, FEMA, 2023 & critical infrastructure assets data from NDGIS, 2023

Figure 4.1.38 shows the juxtaposition of state assets and the 100-year (A Zone) and 500-year (Shaded X Zone) SFHA. Two state assets lie within the regulatory floodplain – the Veterans Home in Ransom County, and the Beulah DOT Maintenance Equipment Building in Mercer County. The total insured value of the structures is $35,139,560. Six government structures are within the 500-year flood zone. Most of these are in Cass County (4), but Ransom and Cavalier counties have one structure each. The most valuable property in the 500-year flood zone is the NDSU Agriculture Experiment Research Greenhouse in Fargo at a value of $29,994,665. The total value of state assets in the 500-year flood zone is $46,759,346.

Figure 4.1.38: State Assets and the Regulatory Floodplain



Source: FEMA, NDGIS

4.1.2.6 State Economy and Economic Disruption

Economic disruptions are a consequence of flooding because it impacts businesses that offer goods and services as well as consumer access to those goods and services. Flooding also impacts the workforce and their ability to get to work.

During flood events, businesses impacted by floodwater cannot operate and experience damage to their buildings, equipment, merchandise, and anything else stored on site. Businesses lose revenue and may face significant costs to clean up, repair, and replace structural and other elements of the business that are damaged by flooding. Standard insurance does not cover flooding. Many businesses may carry National Flood Insurance Program (NFIP) flood insurance policies or private flood insurance policies that require them to file insurance claims and can result in insurance payouts to help them recover quickly. However, depending on the duration of flooding and depth of the flood waters the amount of damage and the impacts to business operations can be severe. Deeper flood waters can cause damage that is sustained, and repair and replacement of building, contents, and equipment can take significant time. If specialty equipment or contents are damaged, replacement time may be further extended. Some flood events can also result in standing water that takes days or longer to go down. Businesses that are inundated by flood waters and debris for days or weeks, such as those shown in **Figure 4.1-39**, can experience significant revenue losses.

Figure 4.1-39: Businesses flooded downtown Grand Forks.

Source: USACE, 1997

Impacts to transportation infrastructure discussed in Section 4.4.1.2.4 can also delay replacement goods, equipment, and materials from reaching a business. In addition, transportation system impacts can cause employee access issues and may prevent some workers from going to their jobs. Workers may also be dealing with impacts to their homes and families due to flooding and may be unavailable.

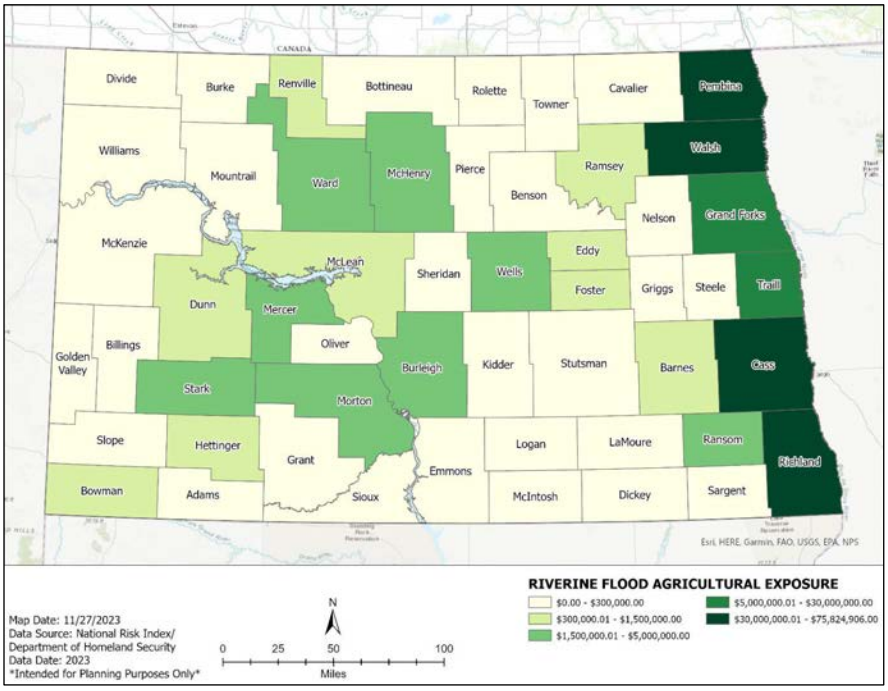
Flooding can cause serious impacts to business revenue and operations. Flooding often impacts multiple business sectors simultaneously, including supply, workforce, and distribution/transport systems.

Small-to-medium-size businesses are the most vulnerable to flooding events as they often lack the resources (capital, etc.) to recover after flood events if significant damage or closure times occur. According to FEMA (2023) roughly 40 to 60 percent of small businesses do not reopen after a disaster.

The agricultural industry is also particularly vulnerable to flooding. In many communities, agricultural land is in flood risk areas due to the proximity to water for crop irrigation and livestock. Floods impact agricultural operations (farms, ranches, etc.) by destroying crops, washing away topsoil, causing livestock to drown or starve, and damaging agricultural equipment, facilities, and infrastructure (fencing, irrigation lines, etc.). Flooding can also cause delays to planting crops and reduce crop yields by impacting crops during the growing season. Seedstock, pesticides, and other farm supplies can be damaged or destroyed by flooding which can significantly impact future plantings and operations. Flooding can also have long term impacts on topsoil. According to NDSU's (2023) tips for handling flooded soils “sand deposits on top of silty or clay-type soils deeper than four inches may decrease potential crop yields” (NDSU, 2023, p.1). Flooding also causes livestock losses, which comes with costs for carcass disposal and can negatively impact livestock breeding programs.

Agriculture is a significant part of North Dakota’s economy. **Figure 4.1-40** shows 23 counties have over $300,000 in agricultural operations at risk of flood damage. The eastern portion of the state has the greatest amount of agricultural operations at risk with six counties having more than $500 million in agricultural operations at risk of flood damage. These include Cass, Grand Forks, Pembina, Richland, Traill, and Walsh counties.

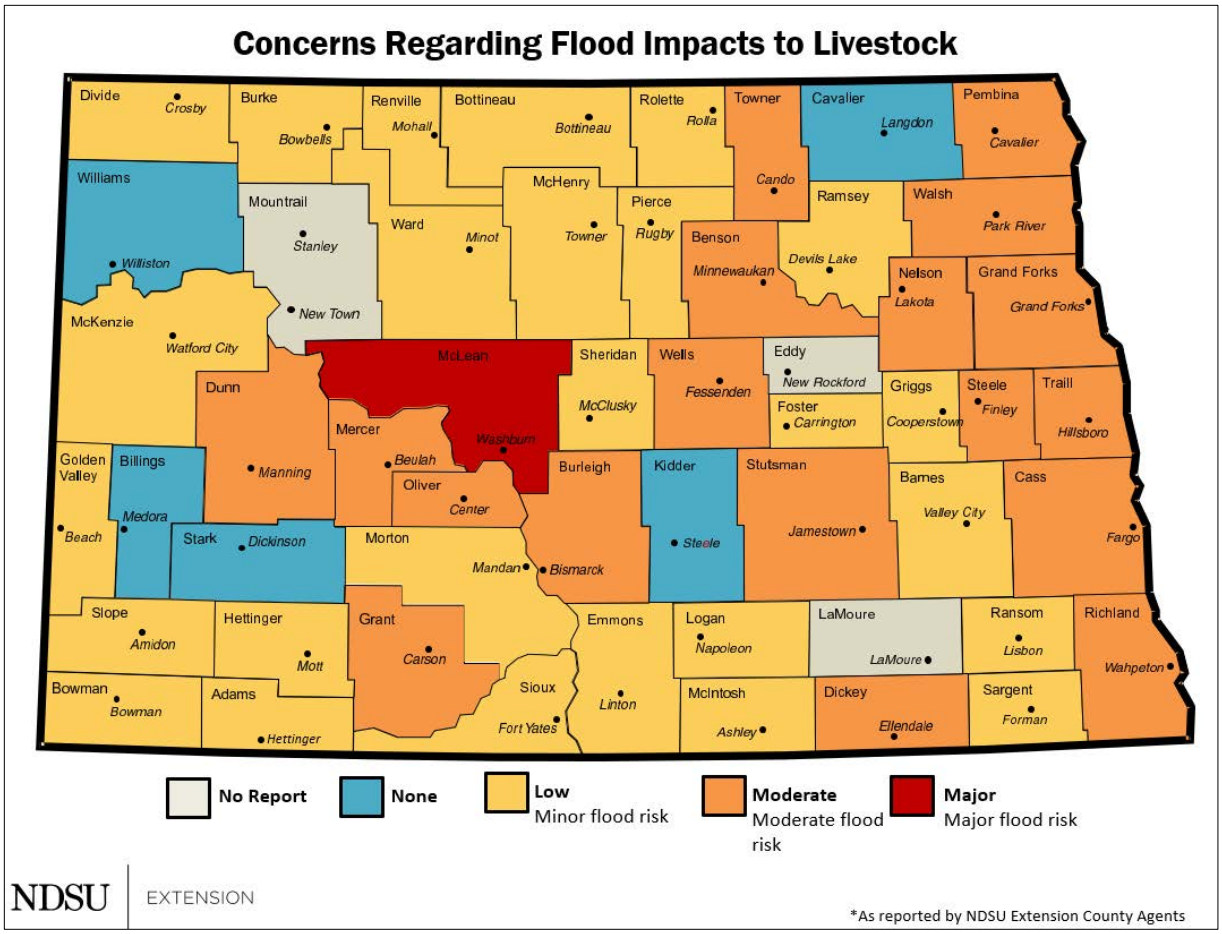
Figure 4.1-40: Agricultural Operations Riverine Flood Risk Exposure



Source: NRI, 2023

Small agricultural operations are the most vulnerable to flood damages as they typically have less resources to recover from serious damage to their operations such as the loss of a significant portion of their livestock and damage to crops and a reduction in yields in the immediate future. NDSU (2023) mapped concerns regarding the impacts flooding could have on livestock by county (**Figure 4.1-41**). McLean County has the highest concerns according to NDSU’s analysis and most of the State has low-to-moderate concerns.

Figure 4.1-41: NDSU Livestock Flood Impact Concern



Source: NDSU, 2023

Another important North Dakota economic sector that experiences flooding impacts is oil and gas production operations (including oilfields). Flooding can result in oil well shutdowns and impact the distribution of oil and gas. It can also cause oil spills which can result in significant contamination of water sources and the environment in general.

The Wildrose wastewater treatment lagoon is inundated due to rising water levels in the area. Growth is creating new flooding issues in several cities as new development has altered drainage patterns. Additionally, much of the new development is located outside of areas studied by FEMA, so their floodplain status is unknown.

(Williams County Multi-Jurisdictional Hazard Mitigation Plan, 2017)

Figure 4.1-42: Dealing with Flooding on a Farm or Ranch.

Source: NDSU, 2023

4.1.2.7 Delivery of Service and Continuity of Operations

Flood events can disrupt the delivery of service and continuity of operations locally, regionally, and statewide, depending on the size and location(s) of the flooding. Damage to critical infrastructure may occur, and transportation systems (roads, bridges, etc.) may be compromised and limit mobility. Communication and power systems may also be disrupted. Law enforcement, fire, search and rescue, and Emergency Medical Services (EMS) services may have difficulty accessing those in need of assistance and there may be significant delays in service delivery.

Critical infrastructure may also be significantly impacted, and the structures located within high-risk flood hazard areas are the most vulnerable during flood events. Any hospitals, police stations, fire departments, etc. that are flooded may not be able to provide service, or service levels may be significantly decreased.

Figure 4.1-43: Firefighters Struggle in Grand Forks Flood, 1997

Source: Takushi, Pioneer Press, 1997. Reprinted with Permission.

4.1.2.8 Public Confidence in the State's Governance

Flood events that cause damage to homes, businesses, and infrastructure can damage the public's confidence in the state's government, if local communities do not feel they are well supported during the flood event and recovery period. The more that state government representatives are engaged with local community efforts before, during, and after a flood, the better the public's confidence in state government will be.

There are some post-flood recovery situations that can cause public sentiments to turn against state governance. For example, if a flood occurs and the state does not have the resources or finances available to provide public assistance the public perception may be tainted, especially if any of the following occurs:

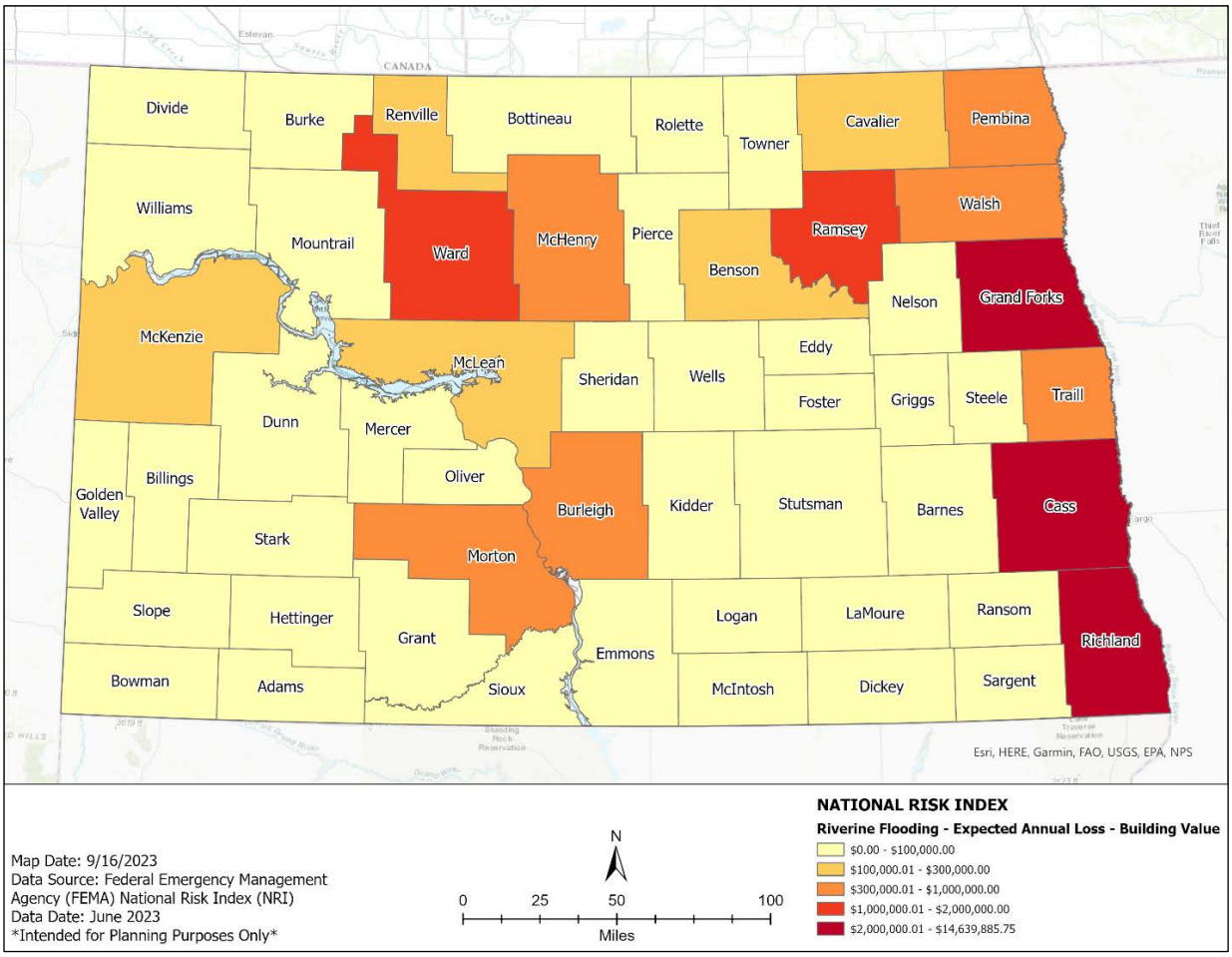
- Impacted homeowners do not have the funds needed to rebuild, due to lack of insurance coverage or because of the overwhelming extent of the damages,
- Local communities do not have the money needed to repair infrastructure,
- Local businesses are impacted and cannot reopen, adversely affecting local or regional economies.

Public confidence in the National Flood Insurance Program (NFIP) can at times be low and this can further impact the public's confidence of all levels of government in general. Communities with limited recovery resources or insufficient recovery procedures and plans are the most vulnerable to loss of public confidence in government after a flood event.

4.1.2.9 Estimation of Annual Losses

Using data from the National Risk Index (NRI, 2023), the state of North Dakota can anticipate $45,853,209.95 in annual building losses from riverine floods. **Figure 4.1-44** shows that the Red River Valley, Ward, and Ramsey counties (NRI, 2023) are the areas with the greatest expected building losses. Combined, the top five counties of Cass, Richland, Grand Forks, Ward, and Ramsey can anticipate $40,096,204.15 (NRI, 2023) in losses, which is 87.4 percent of the state's total.

Figure 4.1-44: North Dakota Expected Annual Loss (Building Value) Due to Riverine Flooding

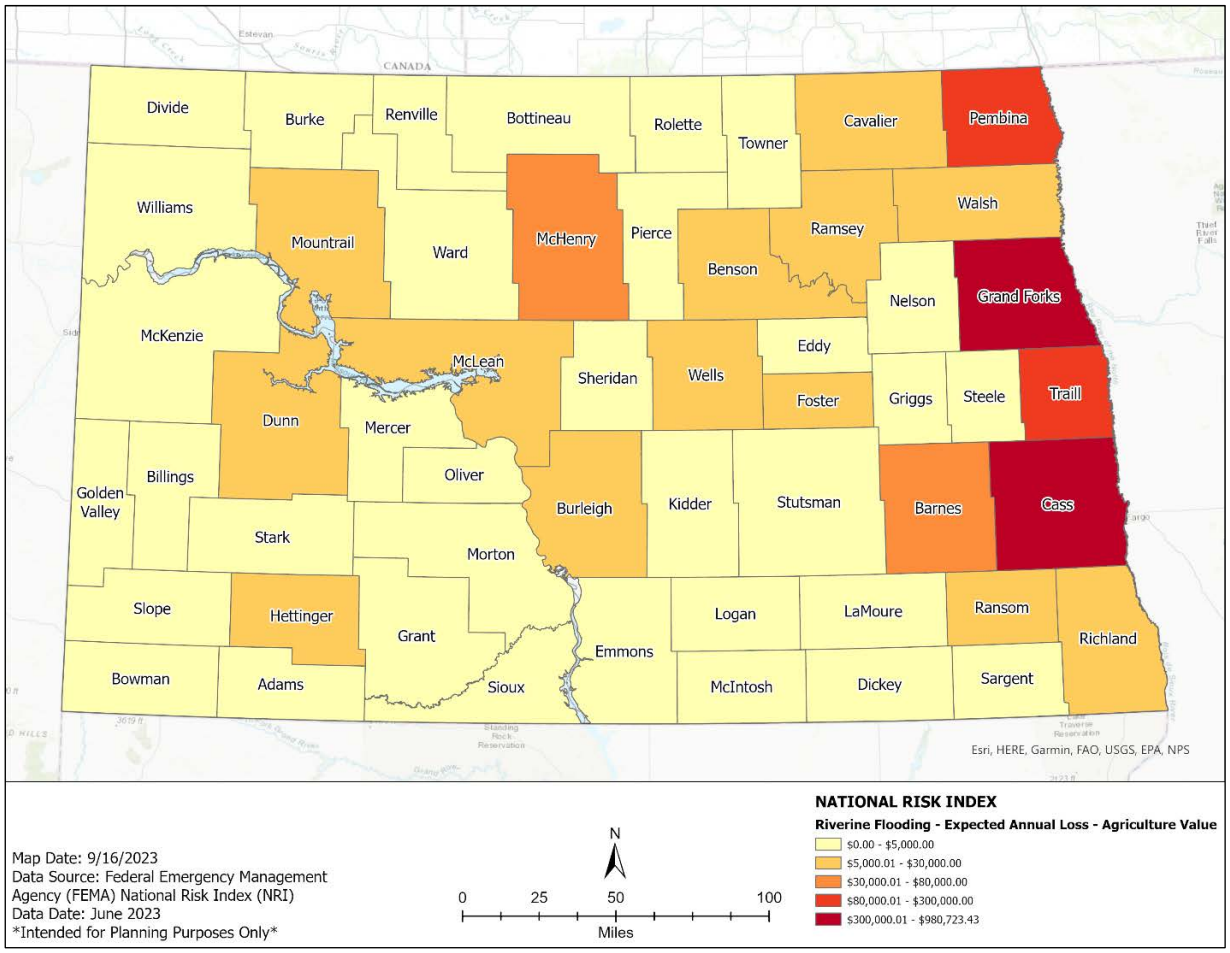


Source: NRI, 2023

The Red River Valley (NRI, 2023) would also factor prominently into expected agricultural losses. **Figure 4.1-45** shows that Grand Forks, Cass, Traill, and Pembina counties account for $1,694,129.03 or 85.4 percent (NRI, 2023) of the state's expected agricultural losses. The fact that most of the losses are

concentrated in a few counties provides an opportunity for the state to make great strides in reducing loss by concentrating loss mitigation (prevention) efforts in those areas.

Figure 4.1-45: North Dakota Expected Annual Loss (Agricultural Value) Due to Riverine Flooding

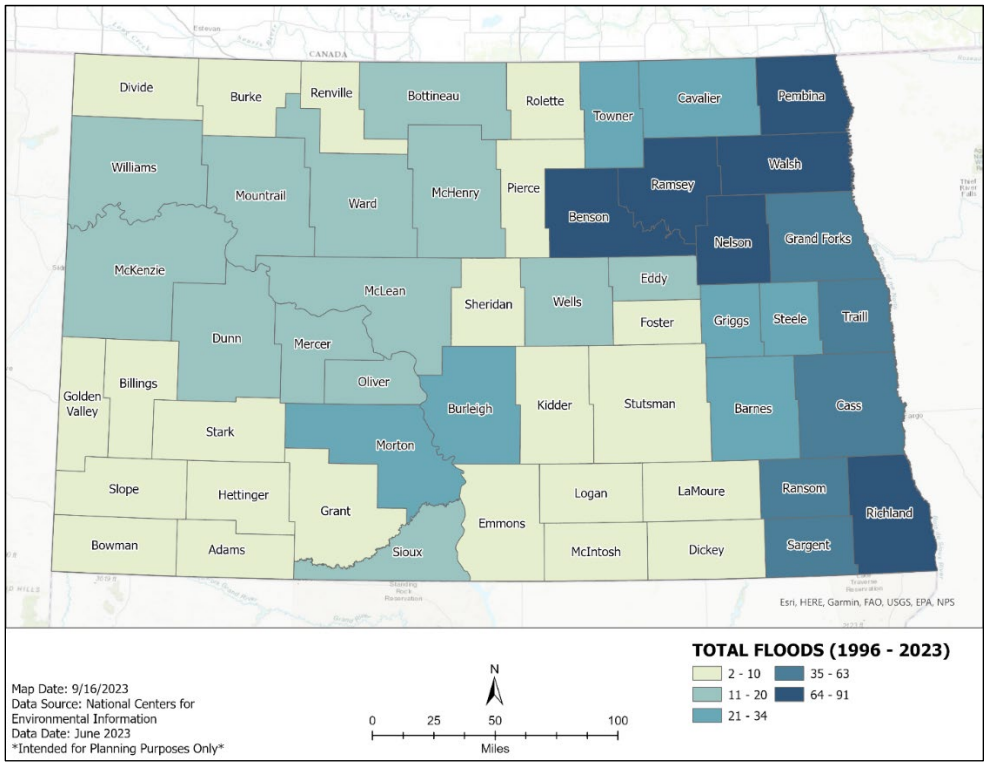


Source: NRI, 2023

While the NRI (2023) has only existed and been used for data in recent years, data on the number of flood events and their respective damages have been collected in the National Center for Environmental Information's (2023) Storm Events Database since 1996. **Figure 4.1-46** shows how many separate flood events have occurred in each county in the state. The Missouri River, Devils Lake, and Red River Basin have more events than other areas of the state. The northeast corner has the largest cluster of counties with 64 or more flood events.

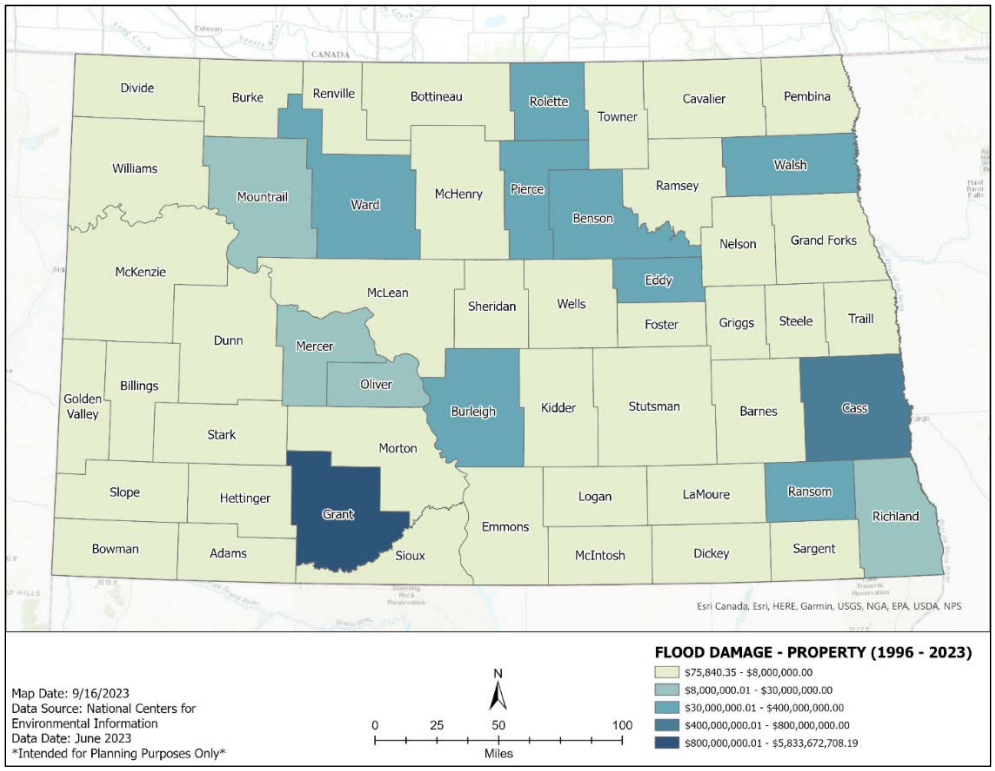
Looking at the amount of property damage in **Figure 4.1-47** paints a different picture. Grant County, which had fewer than 10 flood events, is the only county to exceed $8,000,000 (NCEI, 2023) in property damage since 1996. It is also one of three counties with more than $25,000,000 in crop damage since 1996 (NCEI, 2023), as shown in **Figure 4.1-48**.

Figure 4.1-46: Flood Events in North Dakota by County, 1996-2023



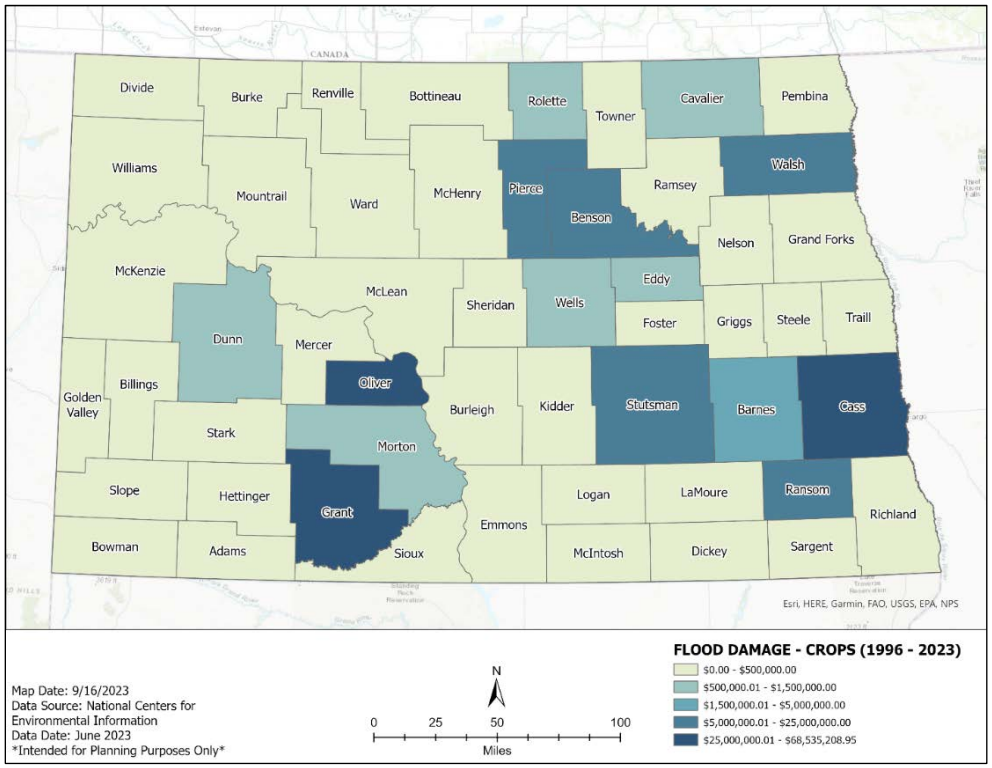
Source: NCEI, 2023

Figure 4.1-47: Flood Damages to Property in North Dakota by County, 1996-2023



Source: NCEI, 2023

Figure 4.1-48: Flood Damages to Crops in North Dakota by County, 1996-2023



Source: NCEI, 2023

Gravel is the main surface coating for county roads. This causes problems during the spring at snowmelt and when the frost comes out of the ground and during periods of heavy rainfall. Under those conditions road surfaces become muddy and soft creating dangerous road conditions. Gravel roads are also more prone to washouts as excess water may exceed culvert capacity as it moves from one pothole/lake to another during high water periods. Gravel roads are also subject to traffic impacts. As farms have become larger, farm trucks have become larger. Small grain, bean, canola, sunflower, and corn harvest times can cause severe road damage as heavy farm trucks move the harvested crops to storage or markets.

(Bottineau County Multi-Jurisdictional Hazard Mitigation Plan, 2015)

Another way to look at crop losses from flooding is shown in **Figure 4.1-49**, which details USDA indemnity amounts paid out for flood events (USDA RMA, 2023). The total amount paid by county and number of events since the last plan update are shown therein. Pembina and Walsh counties in the northeastern portion of the state receive the most crop insurance payouts while also having some of the highest numbers of events. The state should expect $1,421,743.88 in annualized crop insurance payouts based off the 2018-2022 payments, or $38,014.54 per county event.

Figure 4.1-50 provides details on local flood control projects that ND DWR has managed in 2023.The data includes all ND DWR projects of at least $200,000 or more. With more than $91 million in investments – an average of $18.3 million for year – the state anticipates benefits of nearly $270 million. Including losses avoided, results in a $361 million value over the 50-year life of the projects. This includes all benefits not just avoided structural damages.

If the losses avoided are assumed to be uniformly accrued over time, which is not always the case but is convenient for gross representation and should be caveated as such, the avoided losses average $7.2 million per year. This does not include the Major Flood Control Projects that were exempted from the initiating legislation and subsequent policy. The Mandan project along the Lower Heart is responsible for $244 million in avoided damages.

Figure 4.1-49: USDA Risk Management Crop Insurance Claims for Flood 2018-2022

County	Events	Indemnity Amount
Adams	4	$ 6,187.50
Barnes	1	$ 7,750.00
Benson	3	$ 12,723.00
Bottineau	4	$ 18,334.90
Cass	23	$ 756,261.80
Dickey	10	$ 108,403.60
Emmons	4	$ 28,359.00
Foster	6	$ 675,792.75
Golden Valley	2	$ 2,719.80
Grand Forks	16	$ 778,224.05
Grant	1	$ 58,220.00
Griggs	4	$ 36,828.00
Kidder	2	$ 16,818.50
La Moure	9	$ 106,245.50
McKenzie	8	$ 160,322.00
McLean	1	$ 3,174.00
Pembina	27	$ 1,213,137.76
Ramsey	3	$ 506.20
Ransom	7	$ 129,348.00
Renville	2	$ 485,156.12
Richland	2	$ 17,855.25
Sargent	2	$ 49,561.90
Steele	5	$ 95,154.35
Stutsman	7	$ 174,539.80
Traill	5	$ 79,183.75
Walsh	22	$ 1,816,903.86
Ward	1	$ 25,268.00
Williams	6	$ 245,740.00
Total	187	$ 7,108,719.39

Source: USDA Risk Management Agency, 2023

Figure 4.1-50: North Dakota Department of Water Resources Flood Control Projects

Month	Local Sponsor	Name	Cost	Net Benefit
Oct-19	Tri-County Joint WRD	Reconst. of Tri-Co Drain 6 - Phase II	$ 1,642,000	$1,199,309.00
Oct-19	Minot	SWIF Bank Stabilization	$ 1,861,480	$93,997.00
Oct-19	Maple River WRD	Davenport Flood Risk Reduction	$ 3,850,000	($3,963,146.00)
Dec-19	Pembina WRD	Drain 81	$ 726,185	$4,633,709.00
Dec-19	Pembina WRD	Drain 82	$ 2,340,284	$784,060.00
Feb-20	BCWRD	Overgaard	$ 436,301	$396,890.00
Feb-20	SCWRD	Drain 12	$ 691,500	$12,279.00
Apr-20	Pembina WRD	Drain 39 Outlet	$ 468,740	$198,776.00
Apr-20	Traill	Camrud No 79	$ 2,393,000	($52,335.00)
Apr-20	GF-Traill	Thompson No 72	$ 2,036,000	$159,075.00
Apr-20	McLean WRD	Ft Mandan-4H	$ 578,762	($390,101.00)
Jun-20	BCWRD	Bott-McHenry Lat to Russel Drain	$ 622,090	$50,986.00
Jun-20	Maple River WRD	Upper Swann	$ 1,807,000	$390,519.00
Jul-20	Richland WRD	Drain 31	$ 389,034	$254,045.00
Jul-20	Cass WRD	Drain 2	$ 1,221,550	$323,748.00
Dec-20	Enderlin Parks and Rec	Maple Riverbank Stabilization	$ 265,000	$43,063.00
Dec-20	GF-T WRD	GF Drain 59	$ 6,908,290	$9,232,139.00
Dec-20	SE Cass WRD	Wild Rice SnC	$ 240,000	($203,770.00)
Dec-20	SE Cass WRD	Sheyenne River SnC	$ 588,000	($483,335.00)
Feb-21	SE Cass WRD	Cass Drain 40	$ 972,185	$3,085,418.00
Feb-21	Lwr Heart WRD/Mandan	West Levee	$ 19,100,000	$243,616,852.00
Jun-21	Walsh WRD	Drain 31	$ 742,274	$873,834.00
Jun-21	Richland WRD	Drain 31 Recon	$ 488,500	$1,205,318.00
Jun-21	SE Cass WRD	Drain 40 Channel Impv	$ 1,116,485	$2,941,118.00
Aug-21	Sargent WRD	Drain 7 Improvements	$ 1,080,000	($595,883.00)
Aug-21	Steele WRD	Drain 1 Improvements	$ 350,000	$105,820.00
Aug-21	Traill WRD	Thompson Drain Dist 72 Improv	$ 2,412,265	$5,339.00
Aug-21	USRJWB	Pilot	$ 3,868,091	($781,212.00)
Oct-21	NCWRD	Nash-Petersberg Drain deep Proj	$ 1,014,764	($361,977.00)
Oct-21	Traill WRD	Traill Blanchard-Norman Drn 23-40	$ 2,982,000	$548.00
Oct-21	Bottineau WRD	Stone Creek Lateral B	$ 515,280	$2,300.00
Oct-21	GF WRD/City of GF/UND	Drain 9 Improvements	$ 581,654	$1,848,938.00
Oct-21	North Cass WRD	Cass Drain 18 Extension	$ 482,296	($28,341.00)
Oct-21	Neche	Levee Rebuild and FEMA Cert	$ 5,500,000	($1,562,594.00)
Dec-21	Steele WRD	Steele Cnty Drain 1 Lateral A	$ 370,082	$85,038.00
Feb-22	Bottineau WRD	Stone Crk lateral B	$ 521,083	$5,306.00
Feb-22	Pembina WRD	Drain 34 Improvements	$ 2,140,947	$1,628,930.00
Apr-22	GF WRD/City of GF/UND	Drain 9 Improvements	$ 645,125	$1,785,467.00
Apr-22	Traill WRD	Traill Blanchard-Norman Drn 23-40	$ 3,282,985	$247,876.00
Jun-22	Cass Hwy Dept	Wild Rice Hwy 81 Bank Stab	$ 1,500,000	$115,421.00
Jun-22	Pembina WRD	Drain 34 Improvements	$ 2,188,175	$1,502,886.00
Jun-22	Richland WRD	Drain 1 Reconstruction	$ 392,980	($158,956.00)
Aug-22	Bismarck	Sewer Outfall	$ 1,468,120	($1,242,090.00)
Feb-22	Bott CWRD	Landa Drain	$ 3,080,000	$534,862.00
Apr-23	Mapleton	Storm Sewer Lift	$ 690,500	($709,545.00)
Apr-23	Richland-Sargent	Richland-Sargent Drain 1	$ 2,273,455	$2,232,876.00
Aug-23	Jamestown	96-inch Storm Water Repair	$ 2,816,110	$645,738.00

Source: ND DWR, 2023

4.1.2.10 Community Resilience

North Dakota communities have a range of flood resiliency strategies they employ to mitigate flood damage. Some activities include sandbagging and building temporary earthen dikes to protect property, facilities, and infrastructure. According to NDDOT (2022), there are efforts statewide to mitigate flood damage by elevating roadways including I-29. Flood warning systems and flood Emergency Operation Plans (EOP) also exist for many communities across the state. NDDES has a Disaster Procedures Guide (2022) that addresses pre-disaster flood mitigation activities and programs, as well as state level response activities for flood disasters.

In the last two decades, large-scale flood damage reduction projects have been completed in several of North Dakota's population centers, including Wahpeton, Lisbon, Grafton, Burlington, Devils Lake, and Grand Forks. Additional efforts are currently ongoing to complete billions of dollars in flood protection works in Fargo, Valley City, Minot, Mandan, and Bismarck.

4.1.2.11 Future Conditions

Through the end of this century, expect larger, more frequent, with more intense periods of heavy precipitation, both winter and summer (Frankson, 2022; Knapp, 2023). This could lead to more landscape (areal) flooding, more flash flooding, higher annual streamflow, and a higher incidence of rainfall enhanced spring snowmelt flooding.

- **Location:** Flood hazard zones are located across the state and are projected to increase in size. Especially flood prone areas in North Dakota include the Mouse/Souris River Basin, the James River Basin, and the Red River/Devils Lake Basin. This is not expected to change.
- **Extent/Intensity:** Both streamflow with related riverine flooding and areal/landscape flooding are projected to increase due to higher intensity rainfall events and potential landscape/runoff changes. Both the areas affected by, and the areal extent of, flooding may increase.
- **Frequency:** Heavy to extreme precipitation events are projected to occur more frequently, increasing the frequency of flood/flash flood events statewide. Flooding due to intense rainfall and concurrent spring snowmelt flooding is most common across the Mouse/Souris River, James River, and Red River/Devils Lake Basins, and is projected to increase.
- **Duration:** It is uncertain whether floods will increase in duration, but they may. In areas of excessively low relief (flat) terrain, such as the Red River Valley, and during follow-on episodes of excessive runoff (due to excessive rain, or rainfall on or after snowmelt runoff) the rate of streamflow can be slowed by downstream flow/inflow - extending the duration of flooding.

> Walhalla has developed a progressive zoning and development strategy of limiting building in the floodplain to only green space and park projects. Utilities in greenspace have been raised and hardened against flooding to greatly reduce losses.
>
> *(Pembina County Multi-Jurisdictional Hazard Mitigation Plan, 2021)*

Grand Forks (2020) has the most levee-protected area in the state, and its population is growing as rural North Dakota residents move to cities. Most of the levees were built in emergency circumstances. Failure of the existing levees or growth beyond levee-protected areas could increase the risk to life and property in the county. The Three Affiliated Tribes (2018) has growing urban centers in New Town, Mandaree and Four Bears where new residential developments and oil development can increase what is at risk from flooding. Oil development creates a secondary hazard where uncontained floodwaters over drill sites can cause contamination of floodwaters making flooded properties unable to be restored.

The Thunder Butte Refinery is still in development and further contributes to concerns about contaminated floodwaters, which can devastate nearby farms. In Williams County's last plan (2017), it was noted that there were 65 wells currently located in the regulatory floodplain, which are well monitored for flooding, but pose a risk of contamination, and an increase in oil prices could spur additional oil development in the floodplain. In Williams County, residential growth in Tioga and Williston is reaching areas unmapped in FIRMS, exposing development to undetermined flood risk. Devils Lake is the threat to Benson County, which has regulations requiring permanent structures to be located at an elevation of 1,461 msl to protect property from most flooding, but development near the expanding lake is still at risk and roads are flooded regularly. This can isolate people and keep them from getting needed medicines and emergency services. In LaMoure County (2020) and other rural areas in the state, there are communities where there is no FIRM. Communities like Kulm, Verona, Berlin, and Dickey have areas that are known to flood, but are not mapped. New development in rural areas without regulatory FIRMs may be subject to flooding.

4.1.2.11.1 Extreme Climate Variability and Climate Change

Through the end of this century North Dakota's natural yet extreme climate variability will continue to be the primary influencer or signal within each natural hazard (Frankson, 2022). This may directly or indirectly impact areas and peoples across the state over days to decades long timescales, while the much more subtle and gradual trends of climate change over the rest of this century act to extend the range of such variability (Knapp, 2023). Such studies show that both trend and variability could extend beyond that which has previously been documented in the historical record.

Recent climate change trends have shown, and future projections suggest, that the state can expect continued gradual warming in all seasons, with greatest warming in the winter season. Overall precipitation is likely to increase, but with a high degree of inter-seasonal and interannual variability, which could lead to longer and stronger droughts interspersed with more frequent and more intense flooding (Swain, 2015). Severe summer and winter season storms will likely continue to occur in both drier, drought-prone periods, and wetter, flood-prone periods within the state's overall extreme climate variability.

Ward County has a series of naturally occurring coulees that channel water towards the Mouse/Souris and Des Lacs Rivers. Flows of water through these coulees have measured three feet or more during localized heavy rain (6-9 inches in 3 hours). This type of flooding has washed out roads, breached culverts, and damaged bridges. Adding to these phenomena, as the water flows down through the coulees it picks up a great deal of debris and deposits it into the river, compounding the flood hazard. *(Ward County Multi-Jurisdictional Hazard Mitigation Plan, 2018)*

In the Summer:

- **Extent/Duration:** Warmer summertime temperatures in conjunction with higher low-level moisture availability, through any combination of moisture transport and local evapotranspiration, produce larger footprint (areal extent) storms, along with larger areas of heavy precipitation. Such storms do not necessarily produce a larger number of distinct severe weather events per storm; however, the larger footprint area of the storm equates to a larger areal coverage of any corresponding large hail, and/or damaging wind, and/or tornado event impact area with a corresponding increase in duration at any one location (Gust: personal observation based on CY1999-2022 storms; NCEI/Storm Data, 2023). Likewise, warmer summertime temperatures with lower moisture availability produces smaller footprint storms, smaller areal coverage of distinct severe weather events, and a shorter corresponding duration of such events at any location.

In the Winter:

- **Extent/Duration:** Warmer wintertime temperatures in conjunction with greater low-level moisture availability, through any combination of moisture transport and local evaporation, produce larger footprint (areal extent) winter storms along with larger areas of heavy snow and/or ice, with a greater snow-water content (Trenberth, 2003). If larger footprint winter storms travel at the same speed as smaller storms, the storm duration at any one location would increase.

  In warmer winter storm systems, the snow-water ratio (inches of snow produced per inch of water) will be lower (NWS: Snow Ratios, 2023), resulting in a wetter and denser snowfall and snowpack with a greater overall snow-water content (Trellinger, 2018; Kennedy, 2019). This is most common in Colorado Low type winter storms, which currently occur most often in the late fall/early winter period and the late winter/early spring period.

  In colder winter storm systems, the snow-water ratio will be higher, resulting in a drier and fluffier snowfall and snowpack with less overall snow-water content. Colder winter storms are currently typical of mid-winter, with Alberta Clipper and Arctic Front type winter storms most common (Trellinger, 2018). Such storms can often produce significant snowfall in inches of accumulation, though heavy snow bands within the overall storm system may be narrower.

- **Frequency:** Heim and Dewey (1984) found that a more extensive NOAM snow cover contributed to a greater frequency of cyclones in the southern Great Plains and Southeast U.S. and a reduction in the frequency of cyclones tracking further north, across the Northern Great Plains (NGP), due to the displacement of the storm track (Heim & Dewey, 1984). Future climate projections indicate a higher incidence of lesser overall NOAM snow cover and with a poleward shift in snow cover extent and duration expected (Clare et al., 2023), with the greatest shift occurring in the shorter months, and the least in the mid-winter months. However, lesser overall snow cover (depth) could pack higher overall snow-water content.

25% of Haynes ND homes are in the SFHA.

(Adams County Multi-Jurisdictional Hazard Mitigation Plan, 2019)

Projections suggest that the NGP region will experience a decrease in (drier) Alberta Clippers and an increase in (wetter) Colorado Lows (Eichler et al., 2013), which may have implications for future blizzard frequency and intensity. Further, Trellinger (2018) found that temperature rises during the colder months led to a roughly 25% decrease in annual NGP blizzards for the future period 2070-99, as compared to the reference historical period of 1979-2015. In those model projections some blizzards were replaced by their warmer/icier counterparts.

4.1.2.11.1.1 Impact

Impacts include a likely increase (high confidence) in heavy precipitation events overall, higher in northeastern ND and somewhat lesser in southwestern North Dakota, with a commensurate increase in areal and/or flash flooding, and more highly variable riverine flooding. Precipitation increases do not necessarily have a one-to-one relation with flooding, which is dependent on a variety of precursor conditions (Livneh et al., 2016). Current observations show that annual peak streamflow is decreasing in western North Dakota and increasing in eastern North Dakota (Sando et al., 2022). However, flooding increases through the end of this century are considered highly likely.

Most extreme flooding episodes across ND, including those in the past few decades, have been spring snowmelt flooding caused by a combination of widespread heavy winter season snowfall accumulations and rapid snowmelt runoff, with concurrent warm rainfall as a potential runoff accelerant. However, studies have shown that these recent large floods were caused by natural variability within the local climate system (Hoerling et al., 2010; Hoerling et al., 2013; Hoell et al., 2023). The future climate suggestion is that episodes of heavy convective rainfall concurrent with spring snowmelt flooding could increase through the end of this century.

> Dirty floodwaters often contaminate or destroy everything they touch. Historic resources have been lost during flood events. In fact, the North Dakota State Fire and Tornado Fund paid $18,519 to the Grand Forks County Historical Society for flood losses.
>
> *(Grand Forks County Multi-Jurisdictional Hazard Mitigation Plan, 2020)*

4.1.2.11.1.2 Adaptation

Traditional adaptation/mitigation methods used in increasingly flood prone areas include such efforts as raising road and railbeds, building dikes or levees around structures or communities, and the removal of regularly threatened infrastructure from the expanding or potentially expansive floodplain. Adaptation approaches could consider the potential expansion of floodplains and the use of both engineered and nature-based solutions for stormwater drainage (Leitch, 2023). Permeable pavement, wetland restoration, and improved ditching practices could improve soil infiltration and reduce runoff, while zoning/building regulations could help reduce construction and development in flood prone areas.

4.1.2.11.1.3 Mitigation

Flood mitigation actions can include both structural and nonstructural measures (NCSL, 2023). Structural measures can include dams, levees, floodwalls, floodgates, diversion channels, evacuation routes, raised roadbeds and bridges. Nonstructural measures can include property buyouts, elevated structures, relocations, zoning, and building codes.

Much of the future increase in streamflow is projected to occur across eastern and northcentral North Dakota. Flooding increases in the Red River of the North/Devils Lake Basin and has already prompted over $3B+ in infrastructure projects through 2010, mainly in the vicinity of Grand Forks and Devils Lake (Todhunter, 2021). An additional $4.4B+ is currently committed to infrastructure projects through 2027 (Landers, 2021; NDDWR, 2023; Springer, 2023). Roughly $1.2B is or has been committed to the Mouse/Souris River Enhanced Flood Protection Project and roughly $3.2B is committed to the Fargo-Moorhead Area Diversion Project.

Across the state of North Dakota and adjacent river basins, there is a steadily increasing density of weather/climate monitoring stations like NDAWN (NDAWN, 2023) and NDDWR/PRESENS data collection platforms with their respective atmospheric and soil moisture/soil temperature monitoring capabilities (NDDWR, 2018). The Mouse/Souris River Basin remains underrepresented for soil moisture and soil temperature gaging systems, in comparison to like mitigation efforts recently initiated across the Red River and Missouri River basins.

Williams County installed a supplementary "Gap-Filler" Weather Radar in March 2020 (Williams Co., 2020), for an area of increased population and storm related impacts but is otherwise sparse in low-level radar coverage in northwest North Dakota. A similar area of sparse low-level radar coverage persists across southwestern North Dakota and portions of the southern Red River Basin in west-central MN (Berg, 2023). Efforts to fill these perceived gaps are being considered.

> Most of [Divide and Burke Counties] has no exterior drainage resulting in the flood issues caused by snowmelt or heavy rainfall. Trucks have become larger. Small grain, bean, canola, sunflower, and corn harvest times can cause severe road damage as heavy farm trucks move the harvested crops to storage or markets.
>
> *(Burke-Divide Counties Multi-Jurisdictional Hazard Mitigation Plan, 2015)*

The US Army Corps of Engineers, in collaboration with the state climate offices, is now establishing a soil moisture and snowpack monitoring network throughout the middle and upper Missouri River Basin, (Water Resources Development Act 2020; Spinrad, 2021). A total of 529 stations are scheduled for installation between 2021 and 2027 on a 25-square-mile grid at elevations below 5,500 feet. The data from these stations, which include multiple soil moisture and temperature depths and snow depths, will be directly available to NOAA to track and forecast flooding, drought, and other climatic and weather events. Researchers have introduced methods to model cold climate drought (Bazrkar et al., 2020), which in concert with a robust soil moisture and temperature network might be enhanced to function in an operational frozen ground model for the monitoring and forecasting of both drought and flood (Bazrkar et al., 2021). Such model development could integrate a variety of these emergent observational datasets.

4.1.2.11.2 Other Changes

Potential changes include the impacts resulting from the shifting of the Magnetic North Pole, resulting in potential influences of overall Space Weather impacts, and potential subsequent shifts in winter and summer season storm tracks.

The urban areas of the state are anticipated to have a 24.6 percent growth rate between 2020 and 2040 (U.S. Census Bureau, 2020). Areas in and near Fargo, Grand Forks, Bismarck, and Williston will see more

infill development and development on their fringe and nearby smaller communities, increasing the amount of property and people in the way of floods.

The Western North Dakota Counties of Dunn, McKenzie, Mountrail, and Williams have grown at a rate of 72.3 percent since 2010 (U.S. Census Bureau, 2020), and growth is expected to continue at a rate of 54.9 percent. This has already led to new development in areas like Williston, Minot and Dickinson and the rural areas between them. Accommodating the booming oil and gas workforce and their young families will increase development and critical infrastructure in these areas, placing more people and property at risk of harm from floods.

4.1.3 Risk Analysis

Flooding ranks as the highest hazard North Dakota faces with a risk index score of 3.7 (**Figure 4.1-51**). The probability of a flood event occurring is highly likely. The impact of flooding is rated as catastrophic. North Dakota is comprised of large basins and vast extents of low-lying areas that experience sustained flood events, such as continued dam releases in the Missouri River basin and the lake elevation rising in the Devils Lake basin. The spatial extent impacted is often large in footprint.

Figure 4.1-51: Flood, North Dakota Risk Index Score

Flood Risk Index Score Summary	
Probability	Highly Likely
Impact	Catastrophic
Spatial Extent	Large
Warning Time	More than 24 hours
Duration	More than 1 week
Risk Index Score	3.7

Source: NRI, 2023

Warning time impacts the risk of floods causing damage. Generally, the warning time for floods in North Dakota is greater than 24 hours due to the closed basin nature of Devils Lake (lake level increases gradually, over time, with no outfall) and the nature of the Missouri River and Red River basin being heavily dependent on heavy snow melt from neighboring states and countries to cause a flood. Flood events in North Dakota are also anticipated to occur for longer than a week due to dam releases sometimes being continuous along the Missouri River, Devils Lake being a closed basin with no outfall, and the role that snowpack and melt play in riverine flooding. Flood duration also impacts how much damage a flood will cause. In North Dakota, the longer duration flood events can cause a significant amount of damage and impact communities' ability to respond and recover.

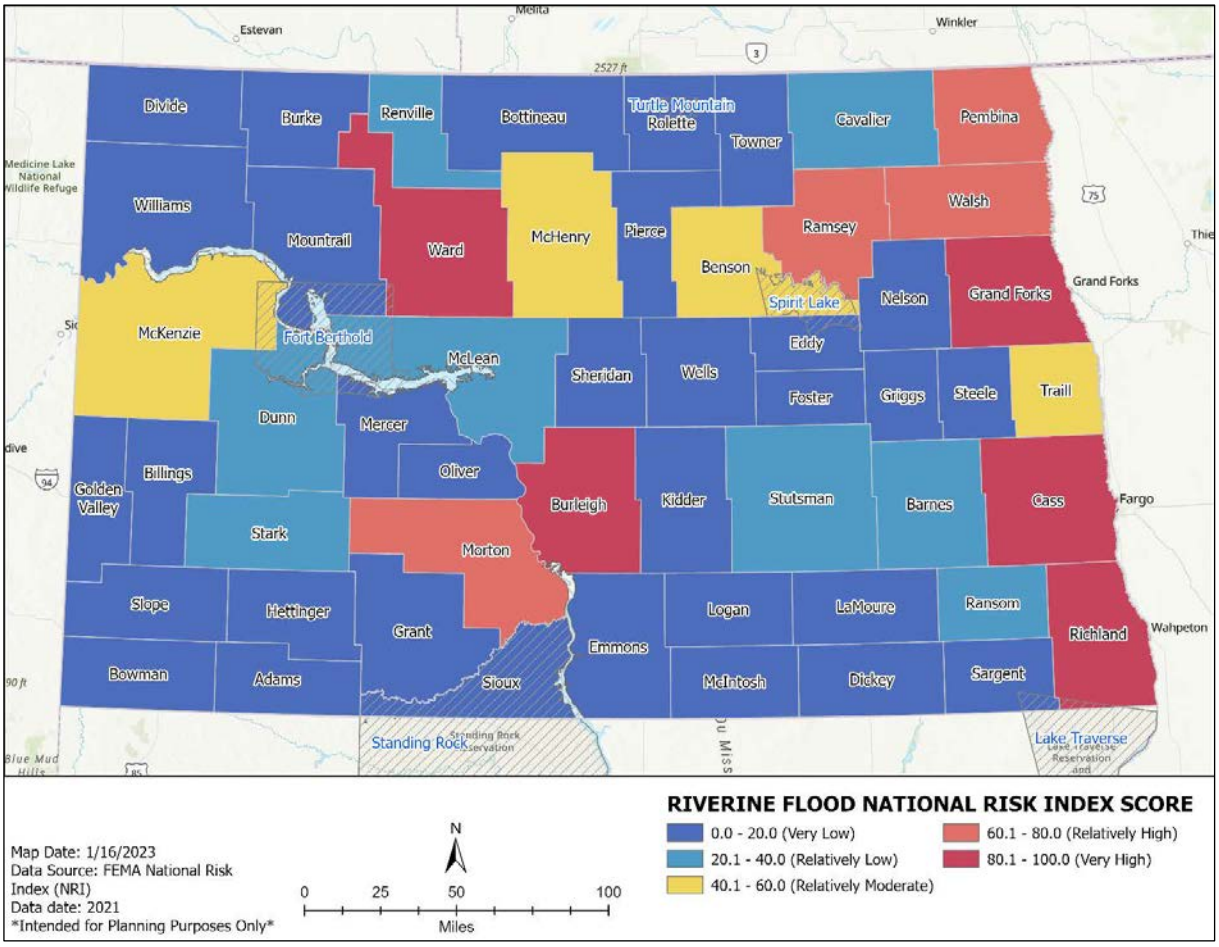
4.1.3.1 National Risk Index

The National Risk Index leverages available source data for natural hazard and community risk factors to develop a baseline risk measurement for each U.S. County and Census tract. The risk equation behind the Risk Index includes three components: a natural hazards component (Expected Annual Loss), a consequence enhancing component (Social Vulnerability), and a consequence reduction component (Community Resilience). The dataset supporting the natural hazards component provides estimates measured in 2022 U.S. dollars. The datasets supporting the consequence enhancing and consequence reduction component have been standardized using a minimum-maximum normalization approach prior to being incorporated into the National Risk Index risk calculation.

Using these three components, composite Risk Index values and hazard type Risk Index values are calculated for each community (county and Census tract) included in the Index. Risk Index values form

an absolute basis for measuring Risk within the National Risk Index, and they are used to generate Risk Index percentiles and ratings across communities. Categories of risk are determined by using quintiles to determine categories, where 0-19.99 are low risk, etc. Risk scores are relative to other counties nationally. Data used to model the riverine flooding in the NRI is based on a 24-year period of record, from 1996 to 2019. Results for the state at the county level are shown in **Figure 4.1-52**.

Figure 4.1-52: National Risk Index Riverine Flooding Ratings for North Dakota



Source: NRI, 2023

When compared to both the state and the nation, urbanized areas of the state are considered to be high risk for riverine flooding due to the regularity of spring floods and the relatively high population and amount of property at risk. The Mouse/Souris and Devils Lake Basin have an elevated risk when compared to the state, but much of rural North Dakota registers as low risk or relatively low risk when compared to the nation.

North Dakota has significant riverine flood risk. The counties that have the most riverine flood risk are in the Red River and Missouri River basins, with a concentration of counties with relatively high flood risk located on North Dakota's eastern border along the Red River. Counties with the lowest risk are generally located further from major rivers and tributaries. It's important to note that North Dakota is

also impacted by closed basin floods and flash floods, both are flood risks that are not captured in riverine data.

Figure 4.1-53: National Risk Index Riverine Flooding Ratings

Riverine Flooding Summary Ratings				
County	Riverine Flooding Risk Rating	Number of Flood Events	Expected Annual Loss Rating	Total Historic Loss Ratio Rating
Cass	Relatively High	54	Relatively High	Very Low
Richland	Relatively High	57	Relatively High	Relatively Moderate
Grand Forks	Relatively High	45	Relatively High	Relatively Moderate
Ward	Relatively Moderate	22	Relatively Moderate	Relatively Low
Burleigh	Relatively Moderate	27	Relatively Moderate	Very Low
Ramsey	Relatively Moderate	58	Relatively Moderate	Relatively Moderate
Pembina	Relatively Moderate	42	Relatively Moderate	Relatively Low
Morton	Relatively Low	18	Relatively Moderate	Very Low
Walsh	Relatively Low	41	Relatively Low	Very Low
Traill	Relatively Low	28	Relatively Low	Relatively Low
McHenry	Relatively Low	15	Relatively Low	Relatively Moderate
Benson	Relatively Low	60	Relatively Low	Relatively Low
McKenzie	Relatively Low	8	Relatively Low	Relatively Low

Source: National Risk Index, FEMA, 2023

Cass, Richland, and Grand Forks counties along the Red River on North Dakota's eastern border receive a relatively high rating for riverine flooding (**Figure 4.1-53**). Counties with relatively high and moderate riverine flood risk are located throughout North Dakota's five basins.

As the riverine flood risk rating for counties increases, so does the expected annual loss rating. However, it is worth noting that the historic loss ratio rating does not align with expected loss values. This means communities may not be prepared or may be underprepared for the losses they are expected to face in the future. For example, Cass County has relatively high riverine flood risk and relatively high expected annual losses (**Figure 4.1-54**), however, it has a very low historic loss ratio.

Figure 4.1-54: National Risk Index Community Information and Summary Rating for Riverine Flooding

Community Information and Summary Ratings						
County	**Population**	**Impacted Area (sq. mi.)**	**Building Value**	**Agricultural Value**	**Community Resiliency Rating**	**Social Vulnerability Rating**
Cass	184,441	157	$40,439,923,739	$504,152,767	Very High	Relatively Low
Richland	16,521	88	$5,591,008,975	$448,145,499	Relatively High	Relatively Low
Grand Forks	73,042	71	$15,976,890,088	$365,247,663	Very High	Relatively Low
Ward	69,879	12	$18,498,801,095	$236,220,211	Very High	Relatively Low
Burleigh	98,437	8	$17,604,065,475	$153,885,294	Very High	Relatively Low
Ramsey	11,577	2	$4,831,464,819	$218,076,128	Very High	Relatively Moderate
Pembina	6,825	225	$2,587,826,104	$324,257,111	Relatively Moderate	Very Low
Morton	33,242	13	$8,505,133,566	$167,490,373	Very High	Very Low
Walsh	10,553	178	$7,624,612,502	$384,895,205	Relatively Moderate	Relatively Low
Traill	7,997	70	$3,926,826,620	$259,114,697	Very High	Very Low
McHenry	5,344	21	$6,546,783,463	$167,836,023	Relatively Moderate	Very Low
Benson	5,945	2	$1,362,172,932	$188,431,961	Very Low	Very High
McKenzie	14,685	0	$4,879,579,357	$120,109,111	Relatively High	Relatively Moderate

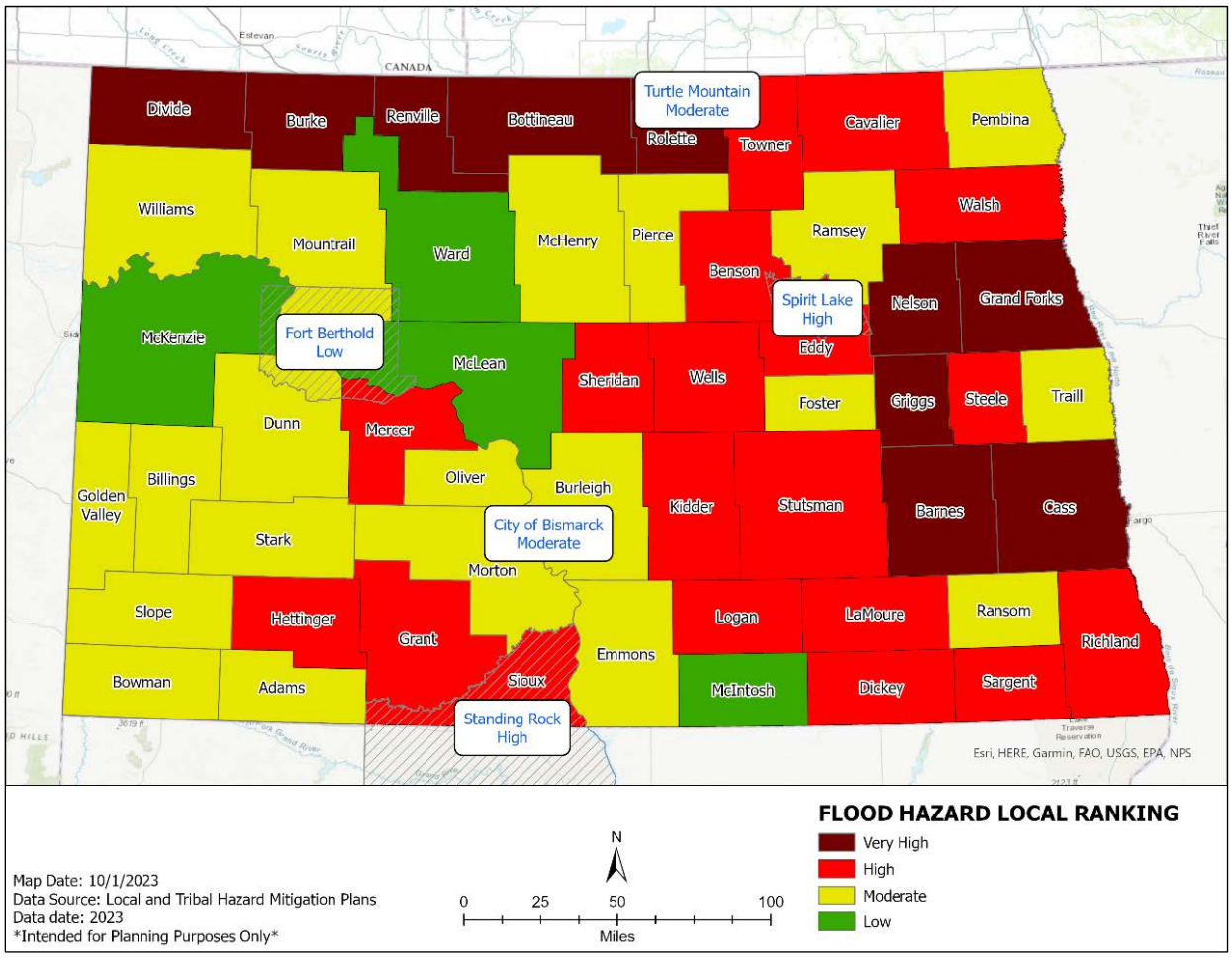
Source: NRI, 2023

Counties with relatively low to moderate riverine flood risk vary in terms of population and square miles impacted. Communities range from very rural counties with smaller populations and more land and agricultural exposure, to larger population hubs where the area impacted is much smaller. Some counties have relatively low flood risk and high social vulnerability. This means when a flood occurs the people who live in the community may face additional barriers during the response and recovery phases. It also means that before a disaster occurs the people that live in these communities may not have the resources to prepare for and mitigate risk. For example, Benson County, which has experienced 60 flood events in the 24-year data period, is a county with relatively low flood risk and high social vulnerability.

4.1.3.2 Jurisdictions at Risk

Local communities identify hazards that are low, medium, high, and very high priority for their communities to address, within their hazard mitigation plans. Fifty-eight communities in ND have hazard mitigation plans that identify flooding as a priority. Most of ND's communities have flooding identified as a medium to high priority hazard. **Figure 4.1-55** below shows that local communities in the northern and eastern portions of the state view flooding as a very high priority hazard that needs to be addressed through mitigation actions. Each local plan identifies mitigation actions aimed at addressing priority hazards and flooding is a statewide concern.

Figure 4.1-55: ND Local Community Hazard Mitigation Plan Flood Priorities



Source: ND Local and Tribal Hazard Mitigation Plans, 2023

Figure 4.1-56: Community Hazard Mitigation Plan Flood Risk Prioritization

Local Mitigation Plan Flood Risk Prioritization	Number of Community Plans
Low	5
Moderate	22
High	21
Very High	21
Not Mentioned	0
Total Local Plans with Flood Risk Prioritized	**58**

Source: ND Local and Tribal Hazard Mitigation Plans, 2023

4.1.4 National Flood Insurance Program

The State of North Dakota and many of its local communities participate in the FEMA National Flood Insurance Program (NFIP) which provides communities with access to NFIP flood insurance in exchange for community regulation of development within flood hazard areas. Participation in the NFIP also

provides communities and the state with access to FEMA disaster assistance and hazard mitigation grant funding.

According to the FEMA Community Status Book (2023) for North Dakota, a total of 336 North Dakota communities and tribal nations participate in the NFIP (FEMA, 2023). As shown in **Figure 4.1-57** there are 25 communities in ND that are currently being sanctioned under the NFIP which means they are either on probation or suspended from participating in the NFIP. Probation causes residents and business owners to pay a $50 dollar surcharge on their NFIP flood insurance premiums. Suspension means that NFIP flood insurance is not available for purchase within a community just as NFIP flood insurance is not available in non-participating communities.

Figure 4.1-57: NFIP Sanctioned Communities

Community	County	Sanction Date (S: Suspended, W: Withdrawn)
Adams, City of	Walsh	07/25/1976
Anamoose, City of	McHenry	07/17/1989(S)
Barnes, Township of	Cass	01/20/2015(S)
Brinsmade, City of	Benson	12/20/2001
Fordville, City of	Walsh	06/04/1977
Gardar, Township of	Pembina	05/03/2012
Gladstone, City of	Stark	08/13/1977
Golden Valley, City of	Mercer	06/27/1976
Hegton, Township of	Grand Forks	12/17/2011
Hoople, City of	Walsh	08/13/1977
Kenmare, City of	Ward	02/23/1983
Lansford, Township of	Bottineau	09/03/2009(S)
Logan Center, Township of	Grand Forks	12/17/2011
Loretta, Township of	Grand Forks	12/17/2011
McKenzie County	McKenzie	09/02/2016
Neche, Township of	Pembina	06/06/2010
New England, City of	Hettinger	07/16/1977
Oberon, City of	Benson	06/20/2002
Park, Township of	Pembina	04/27/1983
Portal, City of	Burke	09/06/1989(S)
St. Thomas, City of	Pembina	02/21/1976
St. Thomas, Township of	Pembina	05/03/2012
Stafford, Township of	Renville	12/02/1987(W)
Stanton, City of	Mercer	04/02/1977
Towner, City of	McHenry	01/31/1976

Source: NFIP Community Status Book, 2022

Participation in the NFIP is important to ensure residents and businesses have access to NFIP flood insurance. The FDIC established a mandatory purchase requirement for flood insurance on all federally backed mortgages issued on properties that are mapped by FEMA as being within the 100-year floodplain (area that has a one percent risk of flooding each year). This helps ensure that property

owners in flood risk areas purchase flood insurance as it can be difficult to get a mortgage and buy and sell property if NFIP flood insurance is unobtainable.

Flood insurance is extremely important to ensure community resiliency to floods and their damage and impacts. NFIP flood insurance is available anywhere (including areas not mapped as having flood risk on FEMA FIRMS). In North Dakota there are a total of 5,684 NFIP flood insurance policies (FEMA, 2023) as of July 2023. Most of the NFIP flood insurance policies are in six counties: Cass, Grand Forks, Ramsey, Walsh, and Ward counties.

A total of $260,586,407 in NFIP flood insurance claims has been paid throughout North Dakota from 1978 – 2023. Grand Forks, Ward, and Ramsey counties have the most NFIP flood insurance claims paid as shown in **Figure 4.1-58**.

Figure4.1-58: NFIP Flood Insurance Policies and Claims by County, 1978-2023

County	Number of Policies	Total Claims Since 1978	Total Paid Since 1978
BARNES	110	393	$2,686,849
BENSON	12	576	$13,477,647
BILLINGS	7	13	$99,601
BOTTINEAU	5	2	$0
BOWMAN	2	13	$15,701
BURKE	1	1	$4,219
BURLEIGH	598	684	$15,255,882
CASS	2,277	3,379	$25,132,141
CAVALIER	1	4	$3,433
DICKEY	1	6	$20,331
DUNN	0	7	$48,098
EDDY	2	6	$19,677
EMMONS	7	83	$1,140,952
FOSTER	2	10	$110,338
GOLDEN VALLEY	0	2	$0
GRAND FORKS	458	3,120	$75,888,332
GRANT	0	8	$50,991
GRIGGS	3	6	$27,160
HETTINGER	2	106	$320,010
LAMOURE	10	10	$78,230
LOGAN	0	1	$252,920
MCHENRY	37	66	$671,970
MCINTOSH	0	2	$7,285
MCKENZIE	12	2	$0
MCLEAN	2	9	$66,662
MERCER	56	92	$923,574

County	Number of Policies	Total Claims Since 1978	Total Paid Since 1978
MORTON	165	231	$2,823,981
NELSON	0	41	$872,095
OLIVER	4	4	$4,703
PEMBINA	84	550	$3,123,691
PIERCE	1	6	$45,786
RAMSEY	50	1,063	$37,304,596
RANSOM	23	144	$690,612
RENVILLE	5	57	$156,632
RICHLAND	46	219	$2,238,211
ROLETTE	2	3	$23,024
SARGENT	0	7	$89,160
SIOUX	2	5	$871
SLOPE	0	1	$0
STARK	35	26	$78,811
STUTSMAN	56	121	$672,682
TOWNER	2	28	$340,500
TRAILL	33	155	$1,611,395
WALSH	120	1,196	$4,743,119
WARD	1,422	1,080	$69,216,538
WILLIAMS	29	19	$247,997
Total	5,684	13,557	$260,586,407

Source: NFIP Insurance Report for North Dakota, FEMA, 2023

Having flood insurance coverage for structures helps ensure funds are available to rebuild, relocate, and recover after a flood event. Disaster assistance does not provide sufficient funds to rebuild, relocate permanently, or fully recover after a flood event (FEMA, 2023). That is why it is extremely important for communities to join and maintain their participation in the NFIP to ensure the public has access to NFIP flood insurance coverage and can protect themselves financially from damages flooding causes to their homes and businesses.

4.1.4.1 Community Rating System

The Community Rating System (CRS) program is a voluntary FEMA program that communities can join if they adopt higher standards and/or go above and beyond the minimum NFIP requirements for floodplain management (FEMA, 2023). Participation in the program gives residents and business owners within communities a discount on their flood insurance premiums which can save communities hundreds to hundreds of thousands of dollars in NFIP flood insurance premium costs. When a community applies to participate their program is evaluated and they receive points for the activities and regulations they have that go beyond the NFIP minimum floodplain management requirements (FEMA, 2023). They receive a CRS class ranking based on their total points received. The CRS classes range from 1-10 with 1 being the best possible (FEMA, 2023). Class 1 communities secure a 45 percent discount on NFIP flood insurance premiums for their residents, in comparison to Class 10 communities

which receive no discount (FEMA, 2023). NFIP flood insurance premium discounts increase by 5 percent with every class (i.e., Class 9 = 5 percent discount, Class 8 = 10 percent discount, etc.) (FEMA, 2023). **Figure 4.1-59** shows the ND communities that participate in the CRS program, their CRS class, and the corresponding discount their community members receive on their NFIP flood insurance premiums.

Figure 4.1-59: Community Rating System Participating Communities

CID	Name	CRS Entry Date	Class	% Discount
380149	Bismarck, City of	10/1/2017	7	15
380141	Burlington, City of	5/1/2017	8	10
380650	Burlington, Township of	5/1/2017	8	10
380142	Carpio, City of	5/1/2017	9	5
380117	Dickinson, City of	5/1/2018	9	5
380143	Donnybrook, City of	5/1/2017	9	5
385364	Fargo, City of	5/1/2006	5	25
385365	Grand Forks, City of	10/1/1991	5	25
385367	Minot, City of	10/1/2016	6	20
380145	Sawyer, City of	5/1/2017	9	5
380002	Valley City, City of	5/1/2017	9	5
385370	Ward County	5/1/2017	7	15

Source: FEMA, 2023

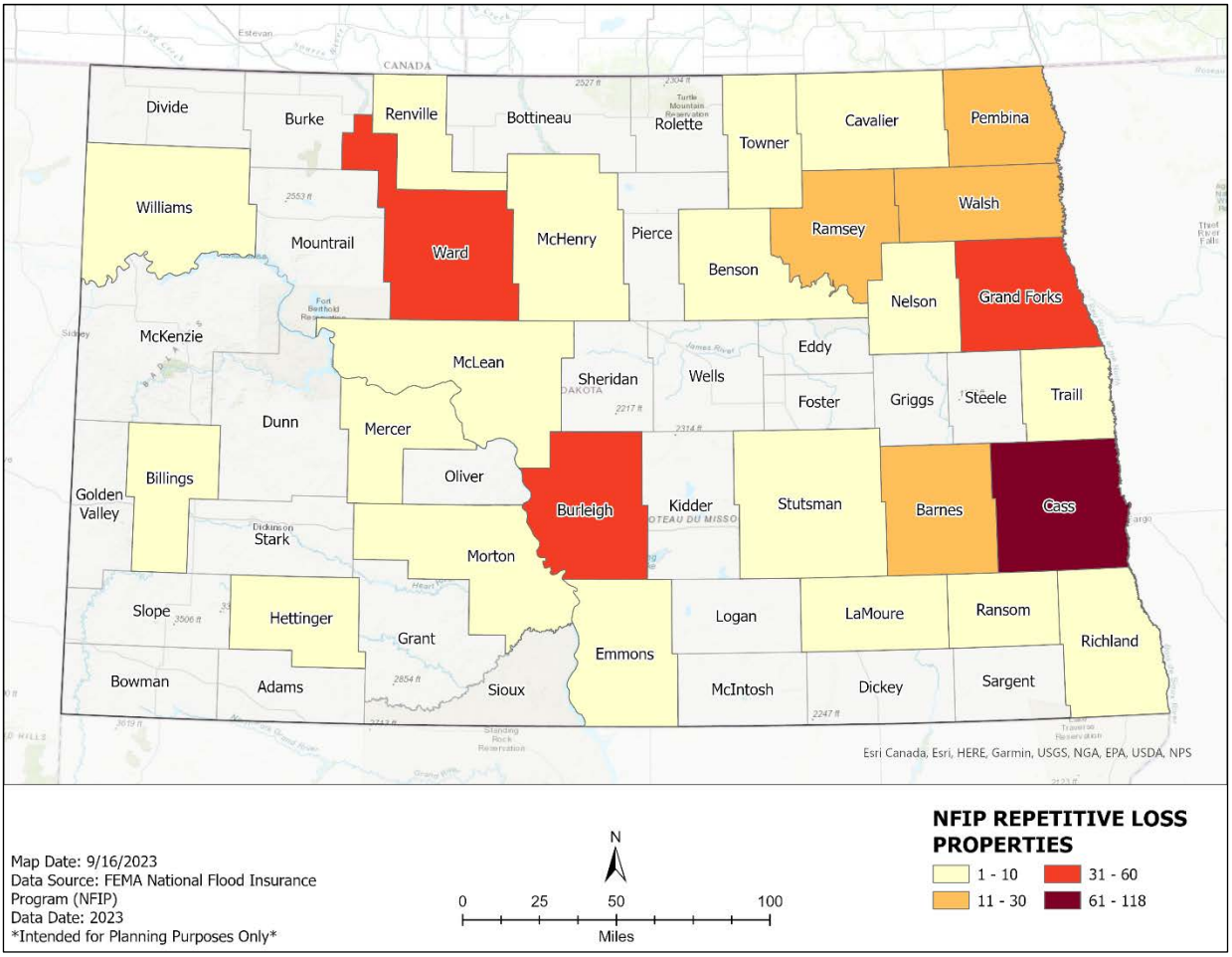
4.1.4.2 Repetitive Loss and Severe Repetitive Loss Analysis

A Repetitive Loss property is defined differently under FEMA's National Flood Insurance Program (NFIP) and Flood Mitigation Assistance (FMA) grant program. The definitions for each program are:

- **NFIP definition of Repetitive Loss**: A RL property is as any insurable building for which two or more claims of more than $1,000 were paid by the NFIP within any rolling 10-year period, since 1978 (FEMA, 2023).
- **FMA definition of Repetitive Loss**: A RL property is any insurable building that has incurred flood-related damage on two occasions, in which the cost of the repair, on average, equaled or exceeded 25 percent of the market value of the structure at the time of each such flood event (FEMA, 2023).

As of 2023, North Dakota has 417 NFIP Repetitive Loss (RL) properties based on current FEMA data (FEMA, 2023). This shows a decrease of 97 repetitive loss properties in the state in a five-year period from 2018 to 2023. Some of the reduction in the number of Repetitive Loss properties is also due to community and state efforts to complete flood mitigation projects to elevate, acquire, or relocate repetitive loss properties. As shown later in **Figure 4.1-64**, a total of 186 mitigation projects were completed over the last five-years, from 2018-2023.

Figure 4.1-60: NFIP Repetitive Losses in North Dakota by County

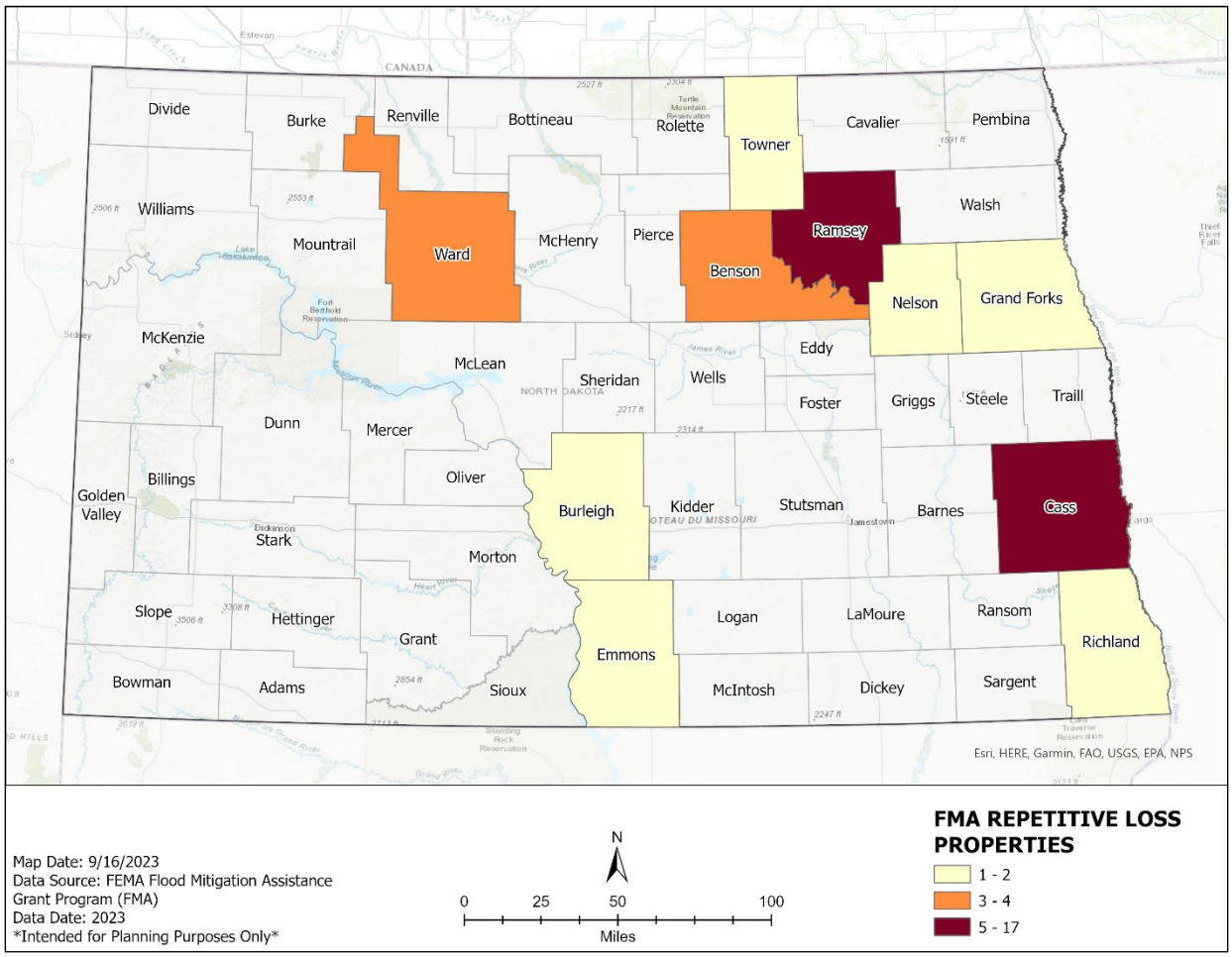


Source: NFIP, 2023

As of 2023, North Dakota has 42 RL properties. These properties have a higher chance of qualifying for FEMA mitigation grant funded projects because they meet the FMA definition for repetitive loss.

As shown in **Figure 4.1-60**, the three counties with the most NFIP RL properties (FEMA, 2023) are Cass County with 118, Grand Forks with 55, and Ward with 48. Ramsey County has the most RL properties with 17. Across the state of North Dakota, there are 26 counties with NFIP RL properties, as shown in **Figure 4.1-60**, and 10 counties with RL properties, as shown in **Figure 4.1-61**. However, the highest concentration of RL properties for both NFIP and FMA is in the eastern portion of the state, in the Red River basin.

Figure 4.1-61: FMA Repetitive Losses in North Dakota by County



Source: SRL Data FEMA, 2023

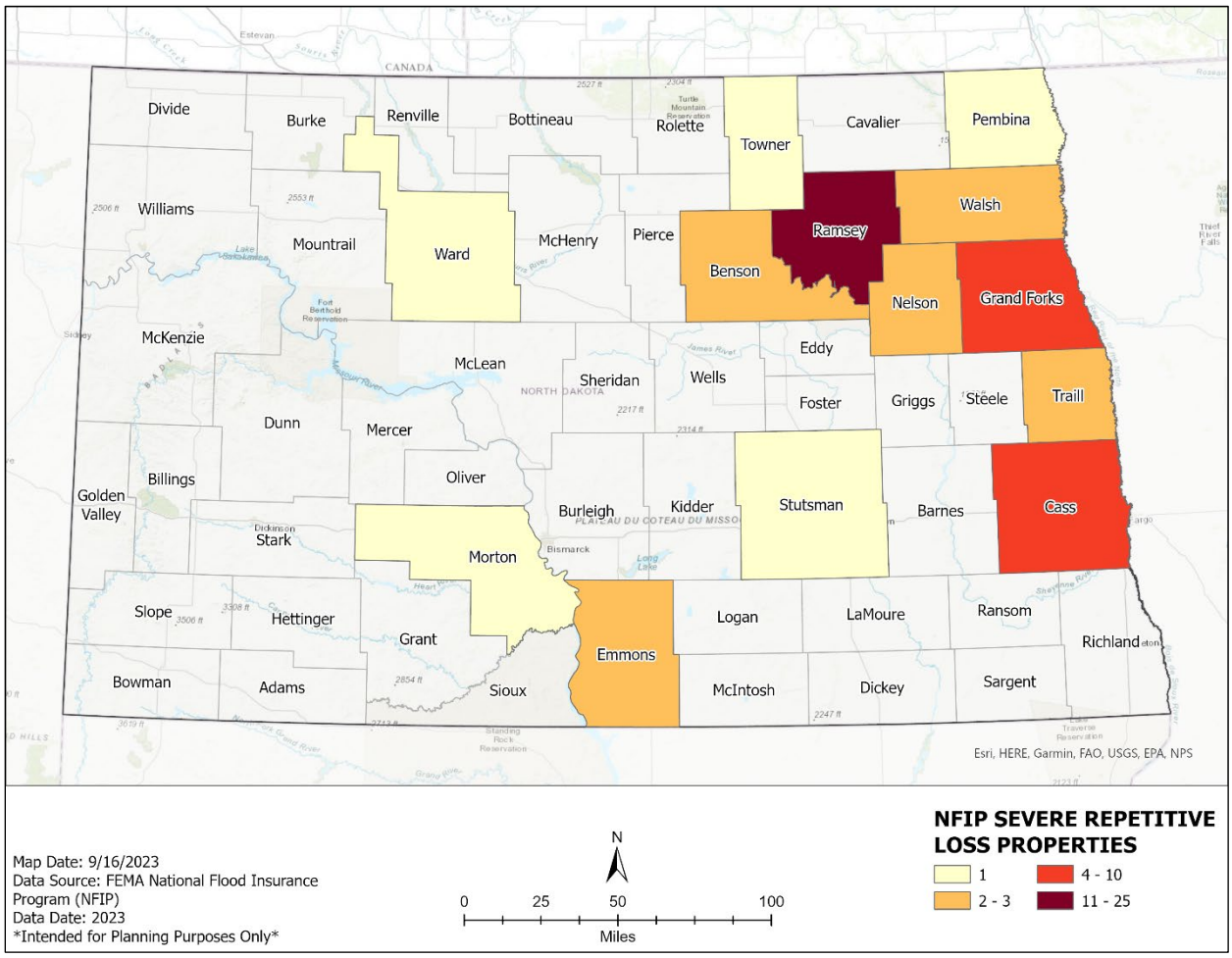
Severe Repetitive Loss (SRL) properties are defined under FEMA's NFIP program and FMA grant program by FEMA and the NFIP. The definitions for each program are:

- **NFIP definition of Severe Repetitive Loss**: Four or more separate claim payments of more than $5,000 each (including building and contents payments); or
- **FMA definition of Severe Repetitive Loss**: Two or more separate claim payments (building payments only) where the total of the payments exceeds the current value of the property.

Figure 4.1-62 and **Figure 4.1-63** show the distribution of NFIP and FMA SRL properties across North Dakota, by county. They show 13 counties with NFIP and FMA SRL properties. Most of the SRL are concentrated in eastern counties, within the Red River Basin.

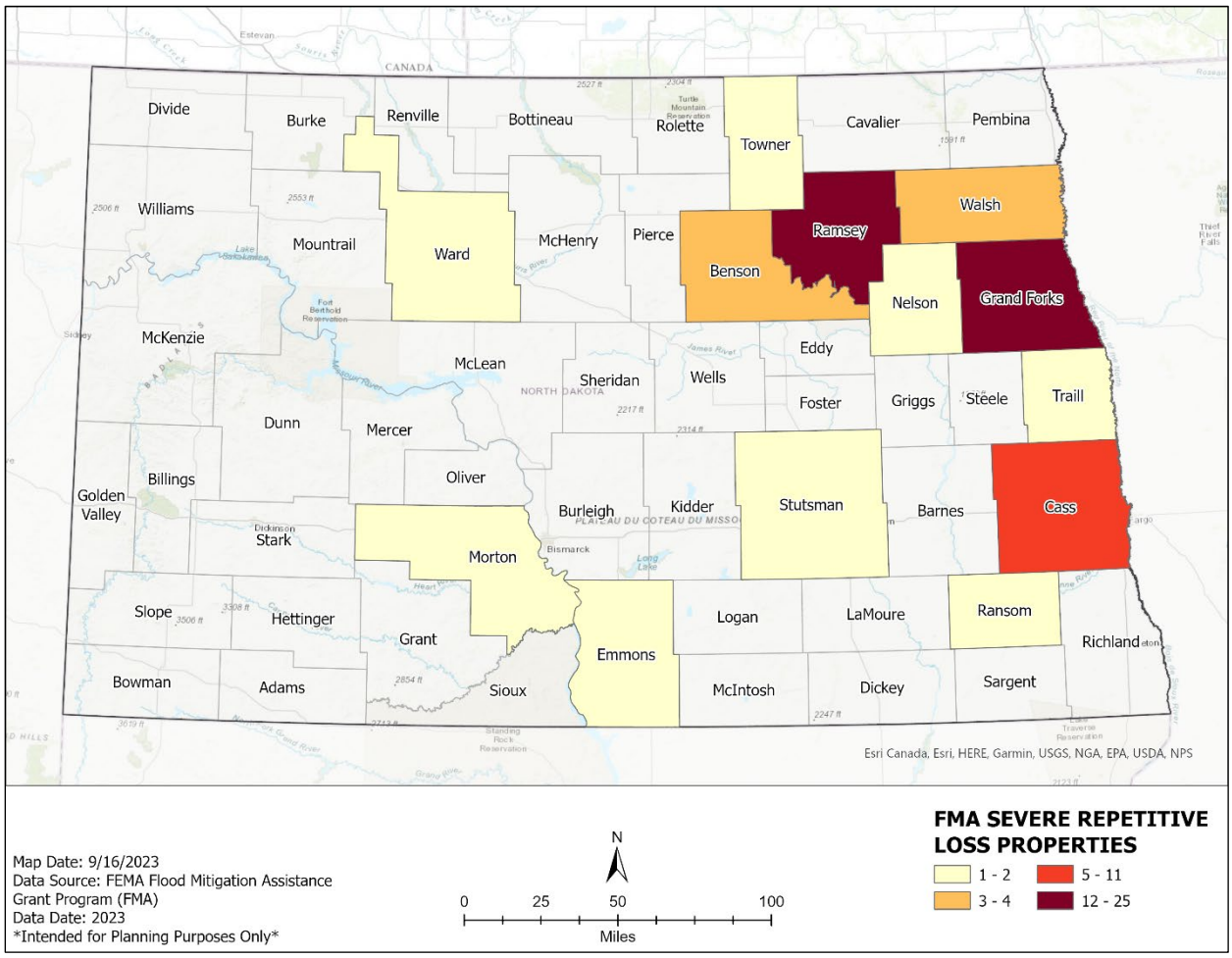
According to the FEMA definitions and data (2023) shown in **Figure 4.1.64**, North Dakota has a total of 59 NFIP Severe Repetitive Loss (SRL) properties and 78 FMA SRL properties. There has been an extreme increase of 137 SRL properties in the state in a 5-year period from 2018 to 2023.

Figure 4.1-62: NFIP Severe Repetitive Losses in North Dakota by County



Source: SRL Data FEMA, 2023

Figure 4.1-63: FMA Severe Repetitive Losses in North Dakota by County



Source: SRL Data FEMA, 2023

Figure4.1-64: NFIP and FMA Severe Repetitive Loss Properties by County, ND

County Name	NFIP Repetitive Loss Properties	NFIP Severe Repetitive Loss Properties	FMA Repetitive Loss Properties	FMA Severe Repetitive Loss Properties	Mitigated Properties
BARNES	20	0	0	0	6
BENSON	8	3	4	3	5
BILLINGS	1	0	0	0	0
BURLEIGH	31	0	1	0	0
CASS	118	10	11	11	53
CAVALIER	1	0	0	0	1
EMMONS	6	2	1	2	0
GRAND FORKS	55	8	1	23	39
HETTINGER	5	0	0	0	3
LAMOURE	1	0	0	0	1
MCHENRY	6	0	0	0	1

County Name	NFIP Repetitive Loss Properties	NFIP Severe Repetitive Loss Properties	FMA Repetitive Loss Properties	FMA Severe Repetitive Loss Properties	Mitigated Properties
MCLEAN	2	0	0	0	1
MERCER	1	0	0	0	0
MORTON	3	1	0	1	0
NELSON	4	2	2	2	3
PEMBINA	19	1	0	0	7
RAMSEY	28	25	17	25	12
RANSOM	8	0	0	1	1
RENVILLE	1	0	0	0	2
RICHLAND	7	0	1	0	0
STUTSMAN	7	1	0	1	2
TOWNER	1	1	1	1	0
TRAILL	8	2	0	2	1
WALSH	25	2	0	4	10
WARD	48	1	3	2	35
WILLIAMS	1	0	0	0	1
UNKNOWN	2	0	0	0	2
Grand Total	**417**	**59**	**42**	**78**	**186**

Source: SRL data, FEMA, 2023

4.1.5 Summary/Conclusion

There is significant flood risk in North Dakota from riverine, ice jam, flash flood, levee failure, high dam release, and other types of flooding. Flooding has historically had extensive impacts on communities, property, infrastructure, and the economy, amongst other facets across the state. The eastern portion of North Dakota has experienced a higher volume of flood events historically. There are also significant flood risks associated with closed basin lakes (i.e., Devils Lake) that are experiencing wetter weather patterns and sustained water level increases.

There is serious risk of future flooding occurring in North Dakota's communities and the potential impacts may equal or exceed those seen historically. Four of the major rivers in North Dakota have a consistent history of reaching flood stage on a regular basis, and, with climate change, the risk of this trend continuing or increasing is high.

The state of North Dakota supports community participation in the FEMA NFIP and CRS programs. Access to flood insurance continues to be important, as from 2018-2023 there was a significant increase in properties that have experienced multiple flood damage events. The state also supports efforts to identify flood risk and organizations partnering to mitigate that risk to the extent possible. A total of 186 properties that had flooded repeatedly have had their flood risk mitigated over the last five-years. This is one example of the many efforts underway across the state to help build community resiliency to flood risk especially in most flood prone areas.

4.1.6 Data Limitations

Data for this section was pulled from a variety of state, local and federal sources. Private and municipal infrastructure data was not included or sought for this state-level plan, such data may provide a more holistic description of risk if it were included.

Primary hazard data sources:

- National Risk Index: a dataset and online tool for risk and community information. Data includes FEMA and CoreLogic's Flood Services. This data is intended for planning purposes. Regional impacts may not be captured in this data.
- North Dakota Risk Assessment
- National Centers for Environmental Information Storm Events Database: North Dakota, All Counties, Begin Date: 1996, End Date: 2023, Event types: Flood, Flash Flood, Lakeshore Flood.
- FEMA floodplain mapping data

Documents used to create the flood hazard profile for North Dakota are noted in the Risk Assessment Reference Section and are cited throughout the profile.

4.2 Fire

4.2.1 Wildfire

4.2.1.1 Overview

4.2.1.1.1 Description

A wildfire is an "unplanned, unwanted wildland fire, including unauthorized human-caused fires, escaped planned or prescribed wildland fires, and any other wildland fire in which the objective is to put the fire out" (National Wildfire Coordinating Group, 2006).

A wildland fire is also defined by the same source to include any non-structure fire occurring in wildlands, which includes intentional prescribed, controlled, and unplanned fires.

4.2.1.1.2 Previous Occurrences

North Dakota has a long history of wildfire incidents. These incidents range from small and quickly contained to large, with the ability to burn hundreds of thousands of acres. **Figure 4.2-1** reports most fires every year are human caused; additionally, a small percentage are caused by lightning each year in North Dakota. **Figure 4.2-2** describes the number of fires and acres by class. Environmental conditions at the time fires ignite, such as drought or wind, directly impact the severity of wildfires.

This article ran in the Dickinson Press on May 17, 2023, by Manuel Holguin, Jr.

Southwest North Dakota grapples with recurrent smoky conditions

In a year marking one of the most severe wildfire seasons recorded in Canada, residents in southwest North Dakota have been navigating the challenges brought by recurring smoky conditions and deteriorating air quality/ State and weather officials continue to offer insights into the current scenario while also sharing suggestions on how to mitigate the effects of smoke and possible frost as the region steps into fall.

Ryan Mills (the ambient air monitoring manager for North Dakota Department of Environmental Quality,) advised residents to be prepared for possible similar events in the fall. "While snowfall is expected to help extinguish the fires, it might initially increase the smoke due to smoldering." He suggested a few measures to curb indoor air pollution, including placing sponges in the cold air intake of furnaces or AC units and utilizing the air recycling button in cars to prevent air from coming inside.

Figure 4.2-1: Number of Fire and Acres by Cause, 2018-2022.

Number of Fires and Acres by Cause										
	2018		2019		2020		2021		2022	
Cause	Fires	Acres	Fires	Acres	Fires	Acres	Fires	Acres	Fires	Acres
Arson	4	90.5	0	0	7	8.26	60	2974.7	16	646.75
Campfire	5	6.2	4	14	18	54.36	27	30.2	10	11.11
Children	1	1	7	205	8	340.7	17	20.48	2	0.01
Debris Burning	144	1,1603.4	232	4,633.8	316	7,612.48	394	14,859.7	190	4,148.09
Equipment Use	107	1,379.6	75	720.17	181	1,946.62	372	20,388.45	138	7,852.39
Lightning	21	184.3	21	16	41	406.33	55	1,087.72	18	73.07
Miscellaneous	146	1c,089.7	140	841	328	1,516.04	656	52,700.66	234	5,463.24
Railroads	20	297.1	16	334.6	20	166.75	15	247.3	14	103.5
Smoking	20	66.2	23	65.4	36	41.07	62	977.31	31	37.48
Total	**468**	**1,4718**	**518**	**6,829.97**	**955**	**12,092.61**	**1,658**	**93,286.52**	**653**	**18,335.64**

Source: ND Emergency Reporting System, 2023

Figure 4.2-2: Number of Fires and Acres by Class, ND Emergency Reporting System, 2018-2022.

Number of Fires and Acres by Class										
	2018		2019		2020		2021		2022	
Class	Fires	Acres	Fires	Acres	Fires	Acres	Fires	Acres	Fires	Acres
Class A - 0.25 acres or less	60	5.4	120	7.54	243	17.34	316	23.08	169	12.05
Class B - 0.26 to 9 acres	310	592.6	311	572.13	542	1,043.92	939	1,915.74	366	709.01
Class C - 10 to 99 acres	75	2,275	70	1,990.6	154	4,261.35	306	8,395.5	89	2,260.58
Class D - 100 to 299 acres	15	2,060	14	2,259.7	10	1,590	40	6,721	17	2,308
Class E - 300 to 999 acres	4	2,245	2	1,000	5	1,980	37	20,102.4	9	3,946
Class F - 1000 to 4999 acres	4	7,540	1	1,000	1	3,200	17	40,109	2	3,800
Class G - 5000 acres or more	0	0	0	0	0	0	3	16,019.8	1	5,300
Total	468	14,718	518	6,829.97	955	12,092.61	1,658	93,286.52	653	18,335.64

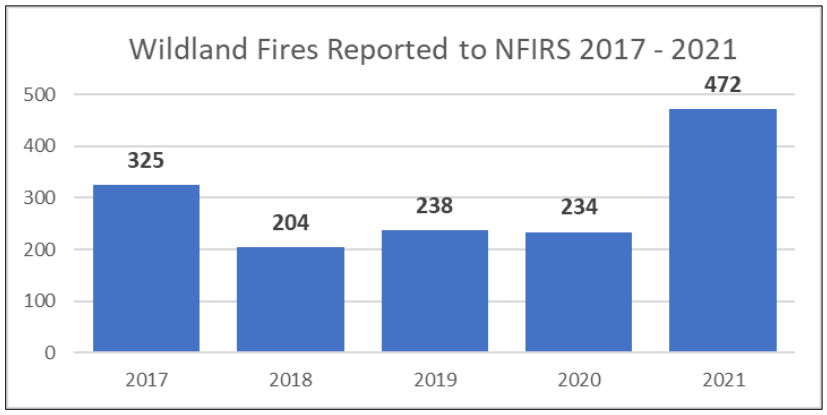
Source: ND Emergency Reporting System, 2023

The National Fire Reporting System (NFIRS) tracks wildfires reported annually, with calendar year 2021 being the most recent available data set, and as

Figure 4.2-3 shows, 2021 was a highly active year for wildfires for the State of North Dakota. Significant named wildfires that occurred in the state in 2021 alone included:

- 2021 – The Roosevelt Creek Fire
- 2021 – The Little Swallow Fire
- 2021 – The Elkhorn Fire
- 2021 – The Sand Creek Fire
- 2021 – The Windy Fire

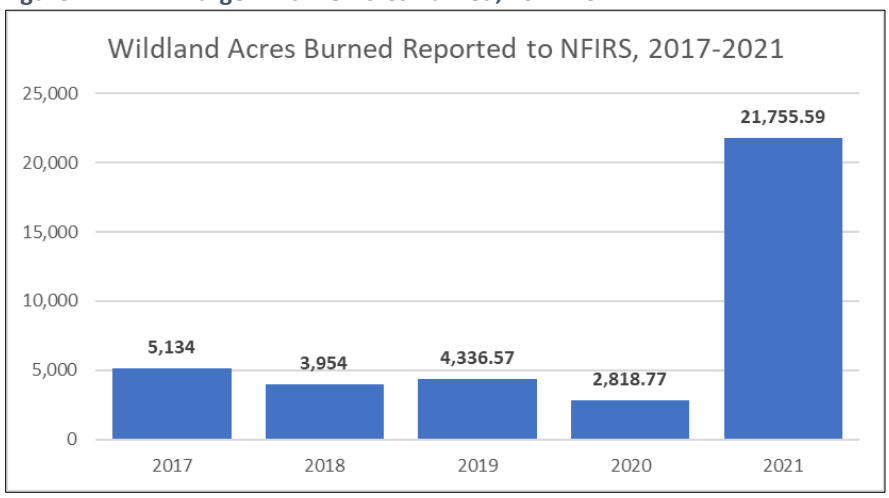
Figure 4.2-3: ND Large Wildland Fires, 2017-2021.



Source: NFIRS, 2023

The number of wildfires typically directly correlates to the area of acres burned. Data provided by NFIRS in **Figure 4.2-4** shows just as the number of wildfires increased in 2021, there was also a significant increase to the number of acres burned due to widespread drought conditions in the state.

Figure 4.2-4: ND Large Wildfire Acres Burned, 2017-2021.



Source: NFIRS, 2023

4.2.1.1.3 Location and Extent

Wildfires occur outside urban areas or the zone known as the Wildland Urban Interface (WUI). Therefore, most of the state's geographic footprint, as a primarily rural state, is exposed to wildfire risk. While some extent remains localized, as **Figure 4.2-5** shows, the spatial extent for wildfire typically impacts a larger geographic area, regional, or statewide. Wildfire risk exposure is negatively correlated to population density; in the less populated areas of the state there is higher risk of wildfire. Wildfire risk is generally higher on the western side of the state than the eastern side.

Figure 4.2-5: Spatial Extent for Wildfire

Resource	Extent
Public	Local/Regional
First Responders	Local/Regional/Statewide
Delivery of Service and Continuity of Operations	Local/Regional
Property, Facilities, and Infrastructure	Local/Regional/Statewide
Environment	Local/Regional
State Economy	Statewide
Public Confidence in the State's Governance	Statewide

Wildfire extent is determined by fire size, measured in acres burned. The National Wildfire Coordinating Group (NWCG) consists of 10 members (Bureau of Indian Affairs, Bureau of Land Management, Fish and Wildlife Service, Forest Service, International Association of Fire Chiefs, Intertribal Timber Council, National Association of State Foresters, National Park Service, U.S. Department of Defense and U.S. Fire Administration) and two associate members (Office of Wildland Fire and National Weather Service) that have collectively determined a universal scale to measure wildfire sizes known as the Fire Size Class Code (NWCG, 2023). Wildfires are reported using a value ranging from A to L, corresponding to the burned acreage (NWCG, 2024). **Figure 4.2-6** lists the NWCG Fire Size Class Code Standard Data Values.

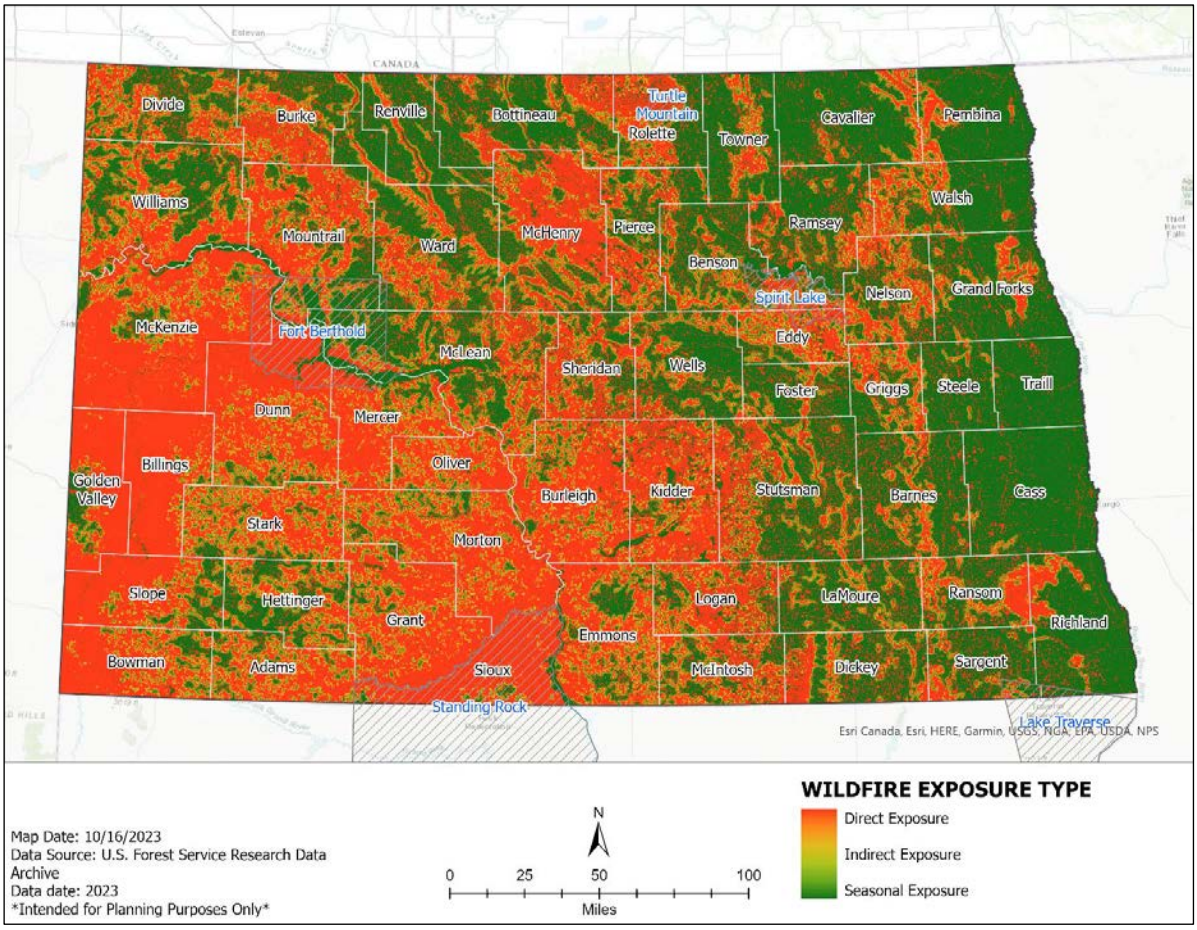
Figure 4.2-6: NWCG Fire Size Class Code Standard Data Values

Value	Description
A	Greater than 0 but less than or equal to 0.25 Acres
B	0.26 to 9.9 Acres
C	10.0 to 99.9 Acres
D	100 to 299 Acres
E	300 to 999 Acres
F	1000 to 4999 Acres
G	5000 to 9999 Acres
H	10000 to 49999 Acres
I	50000 to 99999 Acres
J	100000 to 499999 Acres
K	500000 to 999999 Acres
L	1000000+ Acres

Source: NWCG, 2024

Figure 4.2-7 displays continuous values of wildfire exposure type. across the state. Raster data values range from zero to one, where zero represents areas not exposed to wildfire risk due to the presence of

Figure 4.2-7: Wildfire Exposure Type



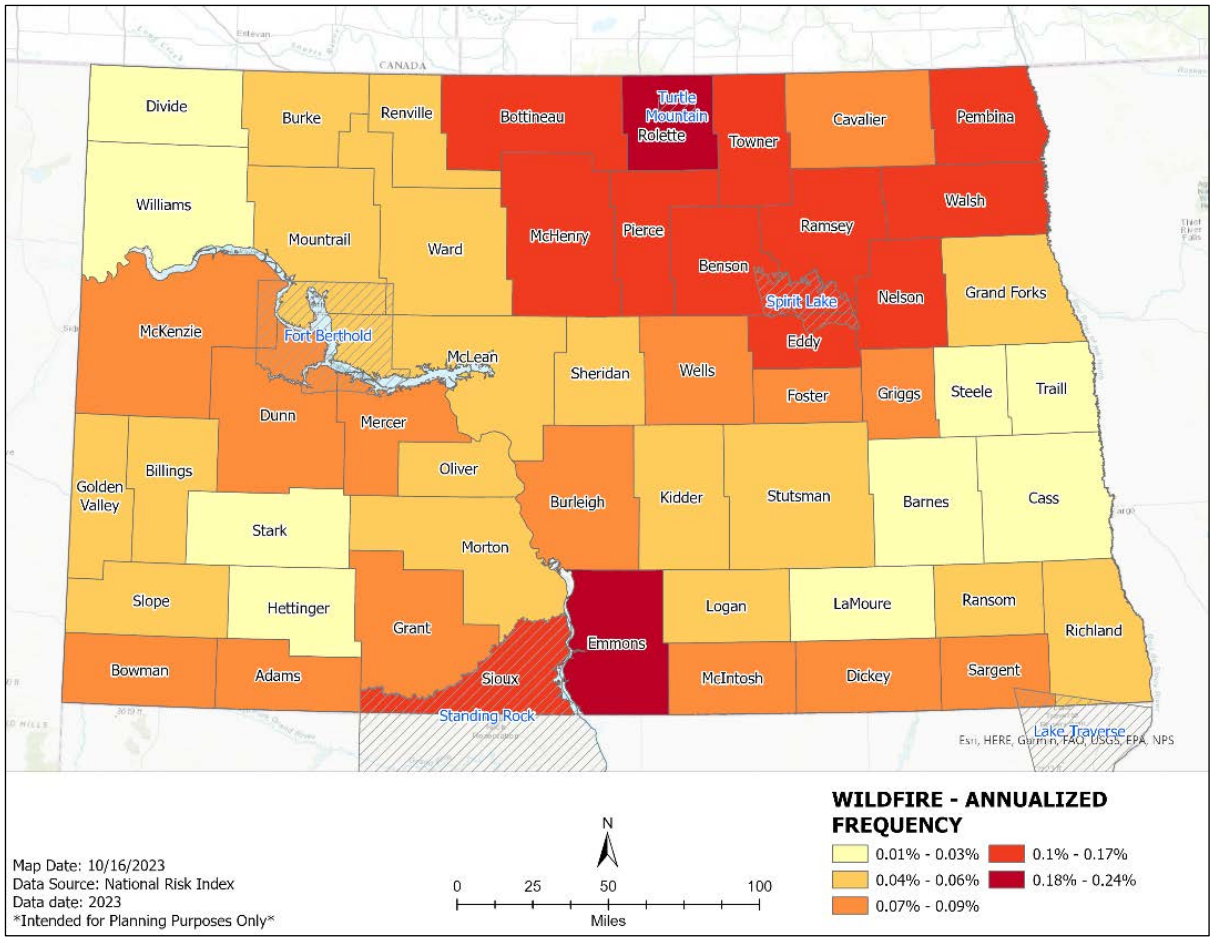
Source: U.S. Department of Agriculture (USDA) Forest Service, 2023

non-burnable land cover and being located more than one mile from burnable wildfire vegetation. Values between zero and one represent areas of indirect exposure, with higher values representing closer proximity to directly exposed areas (i.e., areas of burnable wildland vegetation). A value of 1 represents areas of direct exposure to wildfire.

4.2.1.1.4 Probability

Fire incidents averaged 3,307 from 2018-2022, according the national NFIRS data. Wildfires saw a surge in 2021, with 472 fires, 221 more than the average of the previous four years, according to NFIRS data from 2022 for ND. According to the NICC, more than 49,000 acres were burned in wildfires in 2021. This reflects a 63.9 percent increase in average acres burned from 2018-2022. During that period, an average of 15,430 acres burned per year in wildfires. State data raises the affected acreage that year more than 100,000 acres. While 2021 was a particularly severe year due to a western drought and heat wave, North Dakota's high frequency of wildfires overall means the state has a high probability of experiencing multiple wildfire incidents each year. **Figure 4.2-8** maps the large wildfire annual frequency per county targeting the timeframe of 2021-2022.

Figure 4.2-8: Large Wildfire Annual Frequency, 2021-2022



Source: NRI, 2023

4.2.1.1.5 Warning Time and Duration

> All Nelson County Fire Departments are comprised of volunteer firefighters. As the frequency and intensity of wildland fires increase, these volunteer firefighters may become stressed for resources and time to respond to these fires. Volunteer fire departments are losing personnel strength when firefighters retire and, in many cases, move to larger towns where medical care is more readily available.
>
> *(Nelson County Multi-Jurisdictional Hazard Mitigation Plan, 2021)*

Warning time and duration of wildfire events can vary significantly. The main causes of wildfire are lightning and human activity, both of which offer little warning time. While storms that have the capability to produce lightning can be monitored and tracked, identifying where lightning will or will not strike and if the strike will ignite a fire is not possible. Human-caused fires that are started as honest mistakes offer no warning as no harm was intended and those that are started with malicious intent are not made known. Duration is impacted by the length of time that passes from when the fire is noticed and reported, the time lapse for first responders to arrive on scene, the fire department's capabilities, and the current weather conditions. For example, a fire that starts and is able to grow unnoticed prior to being reported in an area lacking moisture in fuel sources, like grass and trees, on a day that is warm temperature, relatively low humidity, and with windy conditions has higher potential to be more severe and therefore have a longer duration than a fire that starts but is reported quickly on a day that is cool temperature, humid, and lacking wind. Other factors that may decrease warning time and increase fire duration and intensity include the continuity of fuel source(s), the remoteness of the fire, and limited or poor access to roads to the location of the fire.

4.2.2 Consequence and Vulnerability Loss Analysis

This section describes the consequences and state and local vulnerabilities of wildfire. Both consequences and vulnerabilities are defined as follows in the context of this resource:

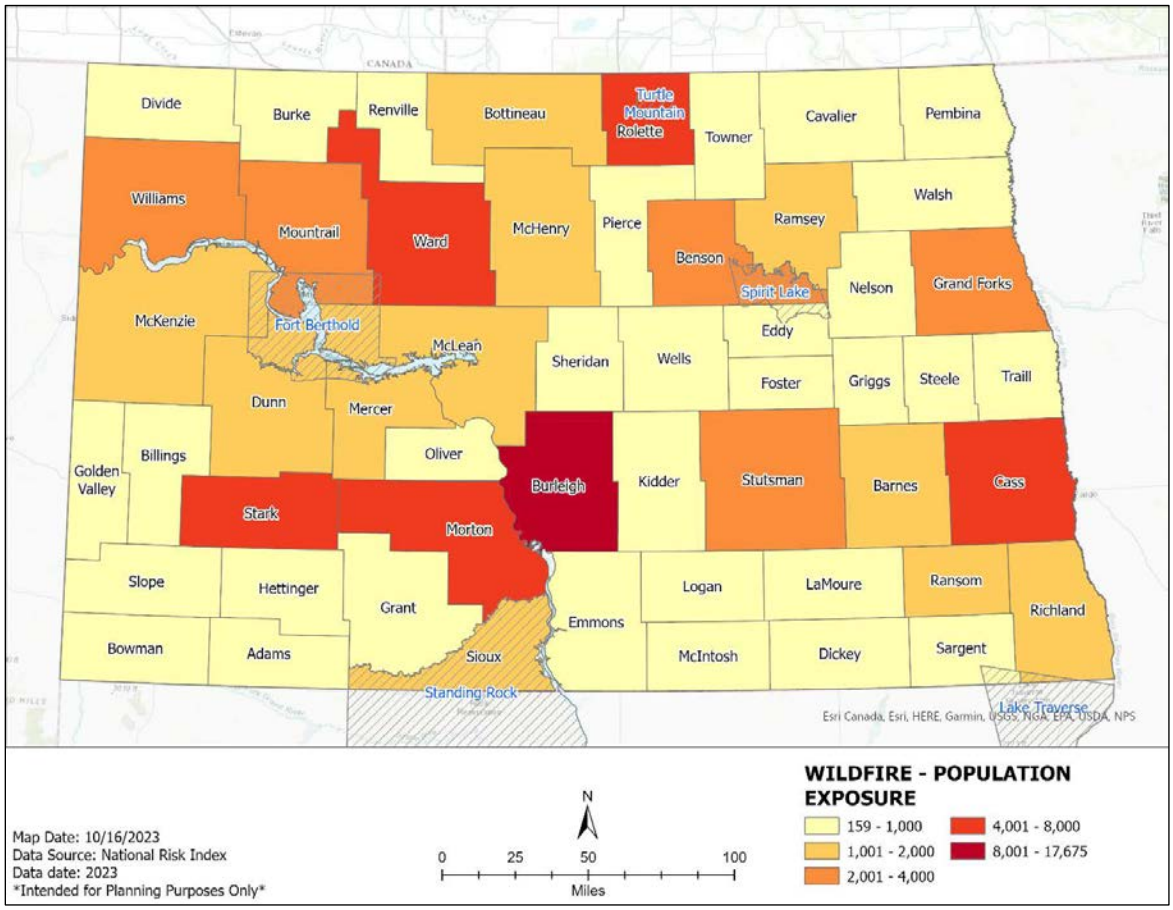
- **Consequence**: is the "degree of debilitating impact that would be caused by the incapacity or destruction of critical infrastructure or a critical function" (FEMA Emergency Management Institute, 2023, p. 1564). Consequences can be tangible impacts to buildings or systems or intangible impacts on processes, business, or reputation. Consequences include debilitating impacts, such as the loss of critical functions, data, or public confidence. It also includes cascading effects that may affect functionality of critical services such as the loss of service of a utility or communications.
- **Vulnerability**: "is susceptibility to physical injury, harm, damage, or economic loss. It considers the extent of injury and damages that may result from a hazard event of a given intensity in a given area" (FEMA Emergency Management Institute, 2023, p. 104). This may be a geographic, social, or economic feature that makes harm from a hazard more likely or more intense.

4.2.2.1 Human Loss

Wildfires, while particularly destructive to property and crops, have not historically caused human fatalities in North Dakota. The proactive combination of fire safety prevention and integrated public alert and warning system capabilities ensure the public has situational awareness in times of wildfire risk

and during actual events. These efforts are made across multiple state departments and help keep citizens safe from wildfires. **Figure 4.2-9** shows population per county at greater risk to wildfire hazards.

Figure 4.2-9: Large Wildfire Population Exposure, 2021-2022



Source: NRI, 2023

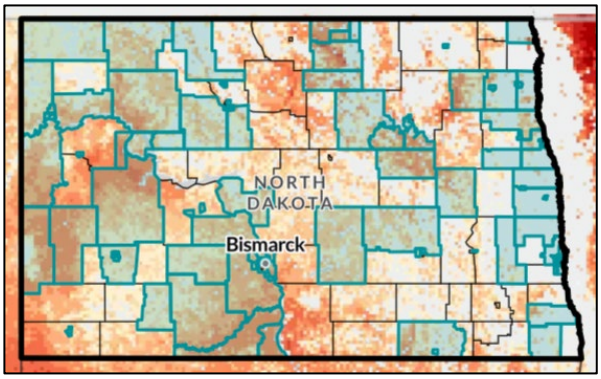
Some populations are more vulnerable to wildfire risk, and if exposed to the hazard would face a higher risk of fatality. These populations include young children, as they are dependent on others for their care and safety as well as individuals with physical limitations or disabilities, and the elderly as they too are populations that may need outside assistance from others when faced with a wildfire hazard. The elderly population also needs special consideration in that they may not have access to the preferred technological options (i.e., social media and digital cell phone apps) that spread public safety warnings and updates.

Other vulnerable populations include households with limited English proficiency, as English is the predominately spoken and written language in North Dakota, and most public safety alerts are posted in English. Households that do not own an automobile are also at increased vulnerability as their options to evacuate are limited to public transportation, which is not highly developed across North Dakota, particularly in rural counties. Public safety alerts and updates are broadcasted across several media platforms (radio, smartphone apps, social media, local television stations); however, households below the poverty line are at increased vulnerability because they may not have access to multiple information

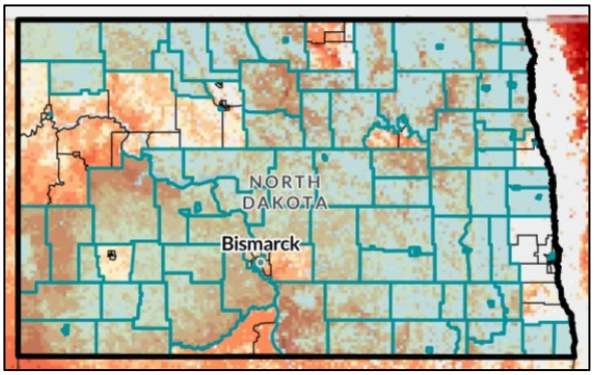
sources to receive safety messaging and hazard updates to make informed decisions to respond accordingly.

Figure 4.2-10 shows data regarding the discussed vulnerable populations provided by the USDA Forest Service across the state, where counties with the blue highlighted areas are above the local median for each category identified.

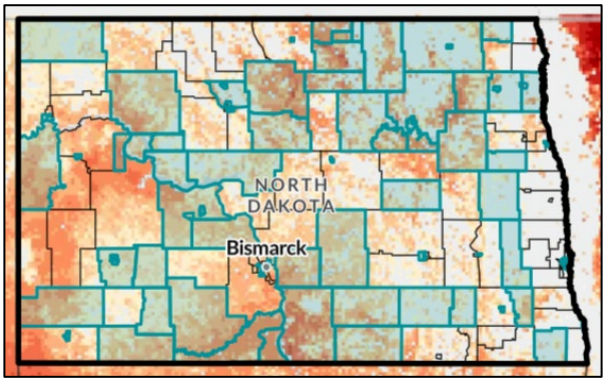
Figure 4.2-10: Vulnerable Populations when Exposed to Wildfire Risk



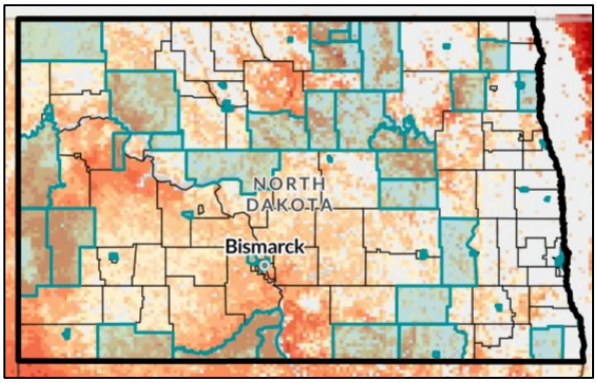
Children Under the Age Five



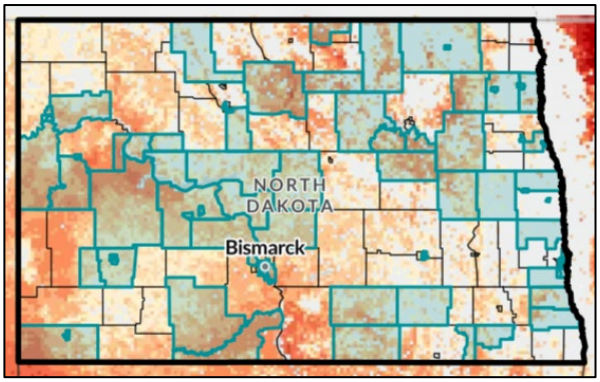
Adults Over the Age 65



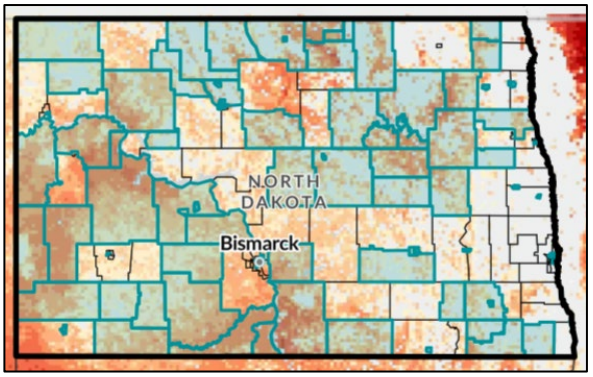
Households in Poverty



Households Without an Automobile



Households With Limited English Proficiency

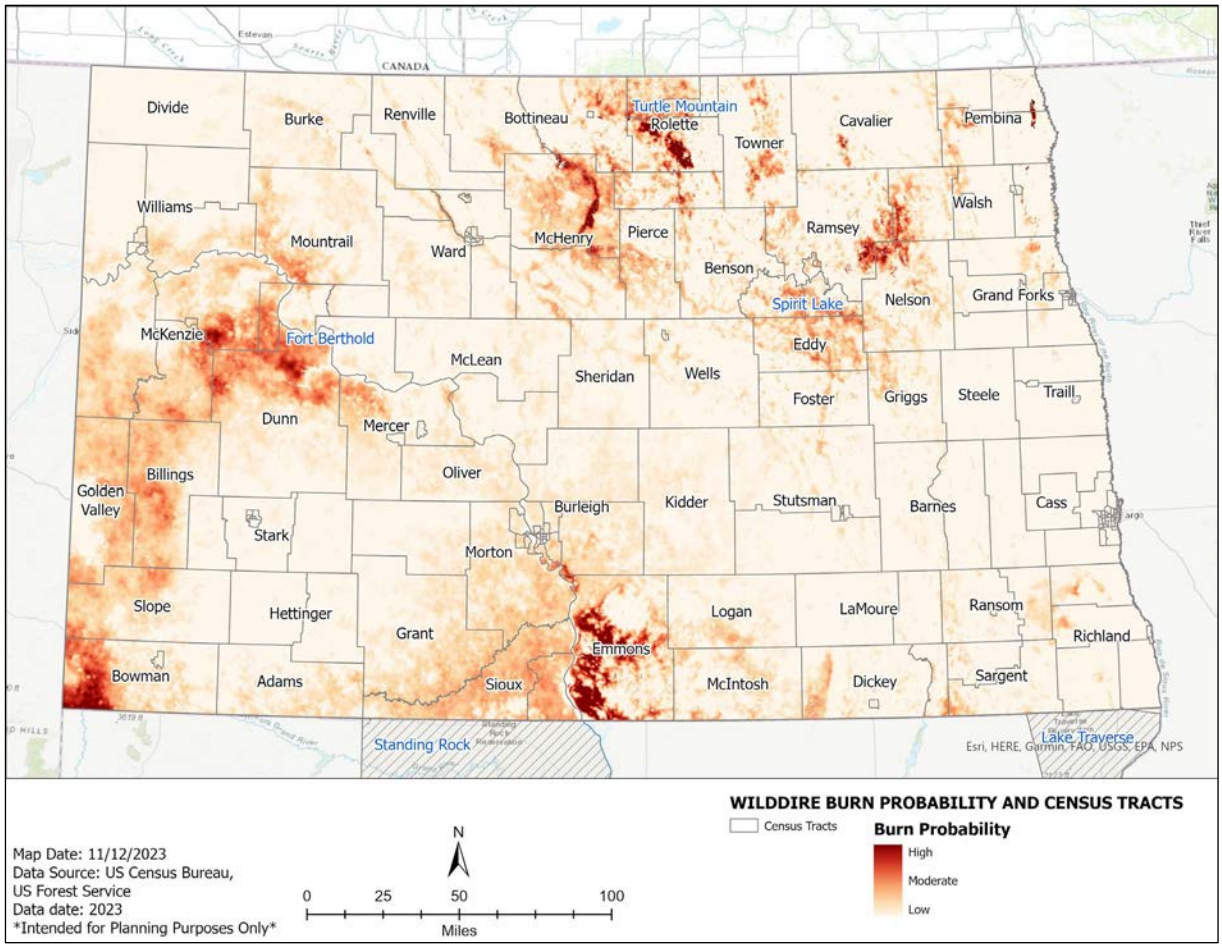


Households With Disabled Residents

Source: USDA Forest Service, 2023

Many miles separate North Dakota's main population hubs. U.S. Census Bureau data was used to determine which populations were at the highest risk to wildfires. **Figure 4.2-11** analyzed a total of 40 census tracts containing a total population count of 108,123 residents that are in areas of moderate and/or high burn probability.

Figure 4.2-11: Burn Probability by Census Tracts



Source: USDA Forest Service, 2023

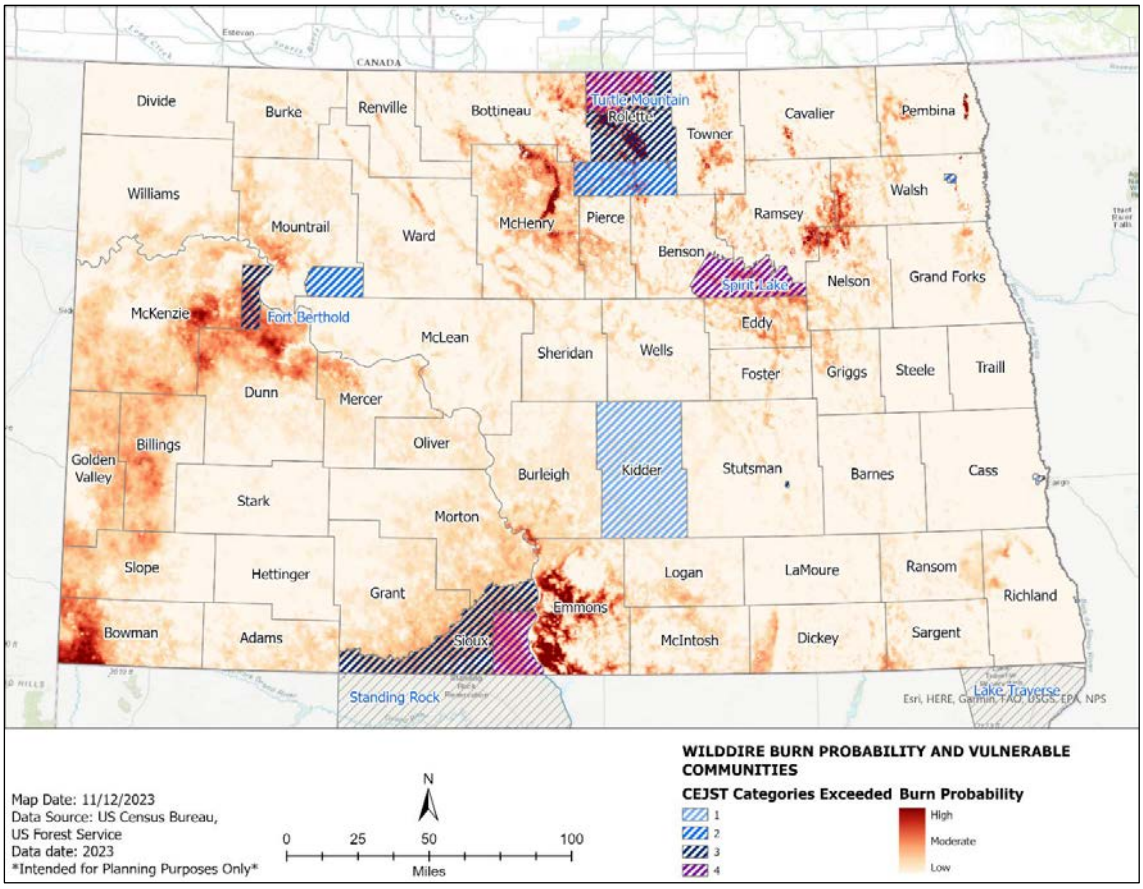
Communities in the analysis include Watford City in McKenzie County, which has more than 5,000 children, comprising more than 10 percent of the population, and Gibbs Township in Burleigh County, which has more than 2,000 children comprising more than 10 percent of its population. Both of these are in medium burn probability areas (ACS, 2021). There are 190 communities with a median age exceeding 65, and 19 of those have a median age 80 years or older. Communities with a median age over 80 and in medium burn probability areas are Denbigh Township (McHenry County), Golden Valley Township (Williams County), and Baden Township (Ward County). Older residents can be less willing and less able to evacuate and are more likely to have memory problems that can create fire hazards.

In 34 communities in the state 100 percent of the population has an income that is 125 percent of the federal poverty level. Areas meeting this poverty threshold and located in medium burn probability areas include South Fork Township (Adams County), Mouse River Township, (McHenry County), and

Arnegard Township (McKenzie County). Communities where a large number of residents lack access to a car can create the need for state resources to aid in evacuation. Two North Dakota communities -- Manitou Township (Mountrail County) and Elverum Township (Pierce County) – are in medium burn probability areas and have 50 percent or more of the population without access to a car. Dodds Township (Nelson County) and Southwest Mountrail Township (Mountrail County) have more than a quarter of residents with low English proficiency in a medium burn probability area, who may not be capable of understanding messaging around evacuation (ACS, 2021). There are no communities in a higher burn probability area that also have disability rates of 75 percent or higher, although seven North Dakota communities meet this vulnerability threshold.

The Climate and Economic Justice Screening Tool (CEJST) is a product from the Council on Environmental Quality (CEQ) which has datasets that are indicators of burden in eight categories: climate change, energy, health, housing, legacy pollution, transportation, water and wastewater, and workforce development (CEQ, 2023). The purpose of the CEJST is to help identify disadvantaged communities, and with that knowledge the state can better direct, assist, and leverage resources to the most vulnerable communities. CEJST scores range from 1 to 4, with four signifying higher levels of vulnerability. **Figure 4.2-12** maps wildfire burn probability with CEJST data, showing that Rolette and Sioux Counties and the Turtle Mountain and Spirit Lake Nations overlap in highest burn probability and vulnerability.

Figure 4.2-12: Climate and Economic Justice Screening Tool Burn Probability



Source: USDA Forest Service, 2023; CEJEST, 2023

Residents in these areas are more likely to lack the resources necessary to evacuate from an approaching fire and may have more housing needs than can be met. They are also more likely to have environmentally induced breathing problems that are exacerbated by smoke.

4.2.2.2 First Responders

When wildland fire incidents occur on non-federal lands, the response is covered by certified fire departments in the state. However, if a wildland fire event occurs on federally owned land or state-owned forest land, the incident is under the jurisdiction of the North Dakota Forest Service (NDFS).

Firefighting services provided across the state of North Dakota can come from career, volunteer, or combination departments. According to the State Fire Marshal's Office Certificate of Fire Department Existence Program, as of 2022 there were 365 fire departments in North Dakota. Of the 365 departments, eight are career employees, 13 are combination, and the majority are volunteers at 344 departments. The same report listed 7,361 for the total number of active firefighters statewide and 255 positions were listed as vacant (ND SFMO, Office Certificate of Fire Department Existence Program, 2022). The Office Certificate of Fire Department Existence Program is an annually updated report sponsored by the North Dakota State Fire Marshal's Office. Fire Departments across the state self-report the data via an internally built and managed database.

The role of a volunteer firefighter has been changing over the last several decades. In the past, fire departments were adequately staffed with dedicated individuals representing ages from young adults in their 20s and 30s just joining the department to older, highly experienced, and trained adults in their 40s and 50s with years of service dedicated to the department. Based on feedback from the North Dakota Firefighter's Association department rosters were numerous and there was high confidence that when a call was received there would be enough individuals ready and available to respond to the need.

Figure 4.2-13: Firefighter Gear

Source: North Dakota Tourism Division, 2023.

Volunteer fire departments today face a struggle in recruiting and retaining volunteers. This challenge is being experienced in various fire departments and communicated by fire chiefs, public safety officials, and overall discussions in conferences, networks, and throughout the fire industry. Many observations have been shared: the level of training and commitment required has increased, younger generations have less time and financial resources to dedicate to volunteering, generations are more mobile and less

long-term rooted in one community than before, the number of places and ways to volunteer have increased thus greater competition exists for those individuals that can and will volunteer, and volunteering is no longer a valued or prioritized personal attribute according to the ND Firefighter's Association.

Growing research is focused on the increased risk firefighting professionals have of long-term health complications. Firefighters are routinely exposed to a large number of toxic substances such as carbon monoxide, benzene, particulate, asbestos, polynuclear aromatic compounds, hydrogen chloride, and cyanide as well as physical hazards such as heat and noise (Melius, 2001). Their emergency medical response duties also put them at risk of exposure to infectious agents. Firefighters are at increased risk of cardiovascular disease, pulmonary disease, cancer, and noise-induced hearing loss (Melius, 2001). This list of conditions is not exhaustive; these are just some of many long-term health complications gaining increasing attention.

Rutgers School of Public Health conducted one of the first studies to evaluate volunteer firefighters' exposure to per- and polyfluoroalkyl substances (PFAS, 2021). PFAS are chemicals that accumulate in human bodies and in the environment and are found in everyday items like electronics and carpeting. The study, which was published in the *International Journal of Environmental Research and Public Health*, compared the levels of nine PFAS chemicals in the blood of volunteer firefighters against levels in the general population.

The study surveyed 135 members of a volunteer fire department in New Jersey on their lifestyle and cancer risk factors/The study compared traces of nine PFAS chemicals in their blood against the levels recorded in the general population by the Centers for Disease Control and Prevention's (CDC) National Health and Nutrition Examination Survey, which tracks the health status of a nationally representative sample of 5,000 people annually. The research found that the levels of two of the chemicals studied — perfluorododecanoic acid (PFDoA) and perfluorodecanoic acid (PFDA) — were higher in volunteer firefighters (Verbanas, 2021). PFDoA levels were found in 80 percent of the firefighters, but very little in the general population. Higher chemical levels also were associated with the number of years of firefighting; the average participant had 20 years of experience (Verbanas, 2021). Volunteer firefighters could potentially accumulate more years of firefighting-related exposures than their career counterparts.

The North Dakota State Fire Marshal's Office nor the North Dakota Firefighters Association currently maintains a thorough database that tracks current volunteer firefighter demographics and trends. Data on the current volunteer base serves as the foundation for understanding the changes in volunteerism amongst firefighters statewide. Analysis of volunteer trends requires routine reporting, surveying, and tracking.. The North Dakota Firefighter's Association, State Fire Marshal's Office, North Dakota's Fire Chief's Association, and NDFS are in the beginning stages of conducting a North Dakota Fire Needs Assessment Survey. According to the training department of the North Dakota Firefighter's Association, the target goal of the survey is to have the assessment information launched yearly in calendar-year 2024. As part of this assessment, information will be requested on recruitment and retention issues, training, and operations from fire departments across the state. The grassroots information can be the start to correcting the concerns reported from volunteer and combination fire departments.

4.2.2.3 Environmental, Natural, and Cultural Resources

Wildfire incidents negatively impact the environment in several ways. Wildfires alter terrain and ground conditions, and the immediate burn scar area leaves the ground charred, barren, and unable to absorb water, creating conditions ripe for flash flooding, debris flow, mudslides, and mudflows (FEMA, 2021). In areas where a wildfire burns hot enough or for long enough, the soil can develop a layer that repels water (NOAA, 2023), like rain on pavement. This will have lasting effects on the landscape and create a heightened risk of flooding in the area for years to come if the burned area is left unmanaged.

The increase in flash flood vulnerability also means an increased risk of debris flow for the same area. According to FEMA, debris flows are fast-moving, deadly landslides. They are powerful mixtures of mud, rocks, boulders, entire trees, and sometimes, homes or vehicles. Debris flows are often called "mudslides" or "mudflows" (NWS, 2023). The NWS states that the terms do get used interchangeably; however, each is a different kind of landslide, and debris flows are considered the most powerful and dangerous of the three.

Figure 4.2-14: Canadian wildfire smoke over Williston.

Source: NDDOT, 2023

Wildfire smoke creates a health hazard for humans and animals, which can be experienced for many miles beyond the location of the fire. For example, in the summer of 2023 North Dakota experienced multiple days with reduced air quality due to active wildfires burning in neighboring Canada based on information from Air Now. is the Air Quality Index that assigns six different air quality levels, and **Figures 4.2-16** and **4.2-17** are snapshots of the reduced air quality North Dakota was experiencing on June 30, 2023. The state was not actively engaged in firefighting operations and citizens and communities were not in harm's way due to the threat of fire; however, the quality of life was disrupted for citizens state-wide due the intrusion of smoke from distant Canadian wildfires, and the threat that this reduced air quality posed for resident health.

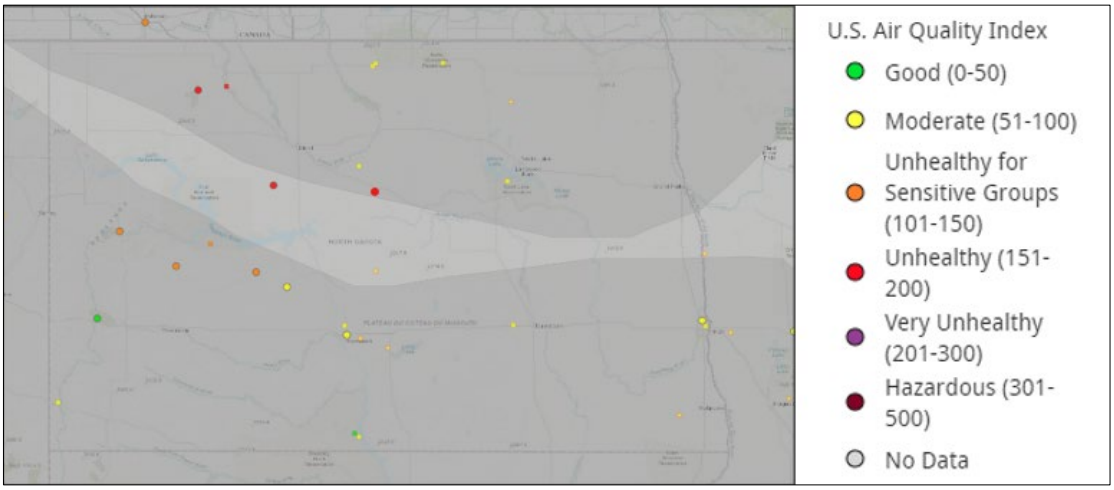
Figure 4.2-15: Air Quality Index Basics

AQI Basics for Ozone and Particle Pollution

Daily AQI Color	Levels of Concern	Values of Index	Description of Air Quality
Green	Good	0 to 50	Air quality is satisfactory, and air pollution poses little or no risk.
Yellow	Moderate	51 to 100	Air quality is acceptable. However, there may be a risk for some people, particularly those who are unusually sensitive to air pollution.
Orange	Unhealthy for Sensitive Groups	101 to 150	Members of sensitive groups may experience health effects. The general public is less likely to be affected.
Red	Unhealthy	151 to 200	Some members of the general public may experience health effects; members of sensitive groups may experience more serious health effects.
Purple	Very Unhealthy	201 to 300	Health alert: The risk of health effects is increased for everyone.
Maroon	Hazardous	301 and higher	Health warning of emergency conditions: everyone is more likely to be affected.

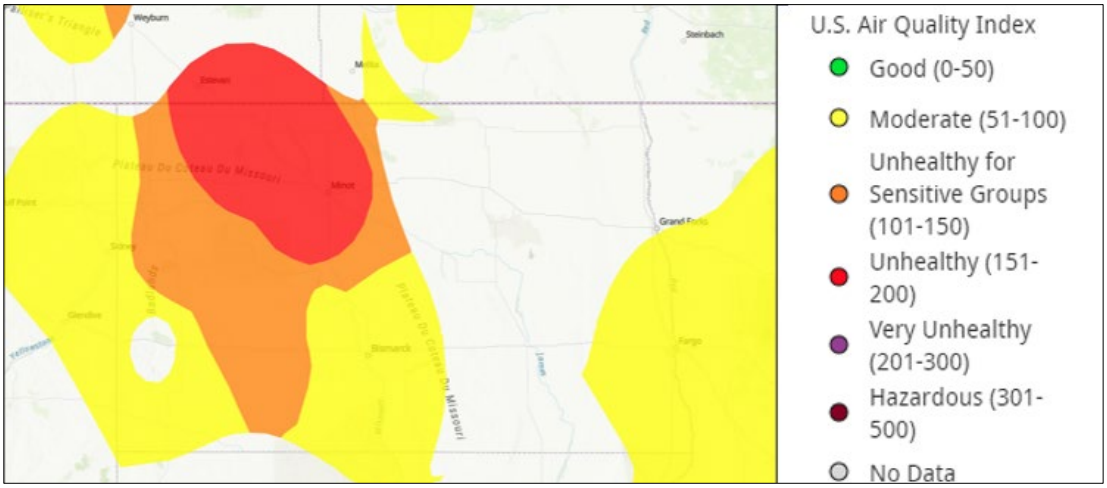
Source: Air Now, 2023

Figure 4.2-16: Wildfire Smoke Plume Map for June 30, 2023, in North Dakota



Source: Air Now, 2023

Figure 4.2-17: Air Quality Index Map for June 30, 2023, in North Dakota



Source: Air Now, 2023

Post-wildfire conditions also increase other health hazards such as West Nile Virus which thrives in a post-wildfire environment. West Nile Virus is the leading cause of mosquito-borne disease in the continental United States; and the warmer temperatures that linger post-wildfire become suitable for efficient virus spread (U.S. DHHS, 2023). Infection patterns follow warmer months, and wildfires occur more often and more severe in warmer season, which per the ND Department of Tourism (2023) extends the length of transmission season for the virus.

Wildfires pose extra concern to natural and cultural resources and landmarks. Fire damaged items and locations can rarely be salvaged or restored. Sites, locations, or items that are rare, culturally significant, or simply irreplaceable need proactive fire prevention, protection, and mitigation planning measures implemented to ensure they are properly safeguarded.

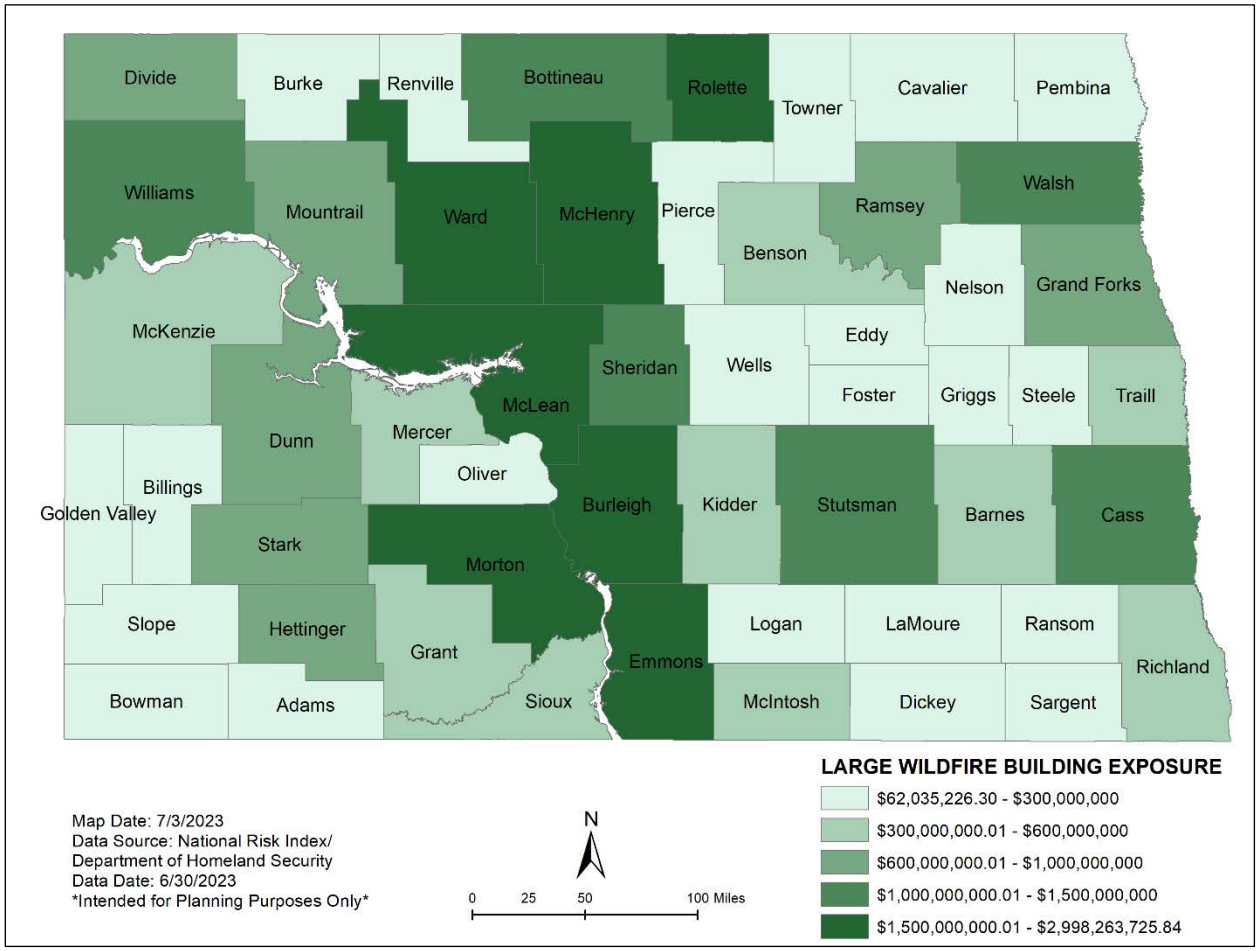
According to the ND Department of Tourism in 2023, some of North Dakota's historic and culturally significant sites that need special safeguarding from wildfire include:

- Fort Mandan – This was the winter home of the Lewis and Clark Expedition from 1804 to 1805, and the fully-furnished quarters brings to life what it was like for the brave Corps of Discovery in North Dakota over 200 years ago.
- Knife River Indian Villages National Historic Site – This was home to Sakakawea when she met explorers Lewis and Clark. Native Americans occupied this area for more than 11,000 years and remains of three Hidatsa villages with 210 depressions are at the site.
- Theodore Roosevelt National Park – Located within the Badlands of Billings County, it is the only national park named after a single person in the United States.
- Little Missouri National Grasslands – Established in 1934, the 198,000 acres along the Little Missouri River are protected from overgrazing and are preserved for future generations and wildlife use.

4.2.2.4 Property, Facilities, and Infrastructure Damage

Rural property, facilities, and remotely located infrastructure are all at greater risk of exposure to wildfires. Rural properties and facilities include ranches, lodges, oil wells, and agribusiness facilities. Irrigation systems, cell towers, and wind turbines are only some of the many examples of rural infrastructure at risk of wildfire threats.

Figure 4.4-18: Wildfire Building Exposure



Source: National Risk Index, 2023

Figure 4.4-18: from the National Risk Index maps the largest wildfire building risk exposure is clustered in the central part of the state, spanning from the southern to northern border. Other areas of high wildfire building risk exposure are located to the northwest, the northeast, and the north-central sides of the state. **Figure 4.2-19**: displays a railroad trestle that has been destroyed by wildfire.

According to the North Dakota Labor Market Information center (NDLMI), the Bakken Formation is one of the largest contiguous deposits of oil and natural gas in the U.S. (NDLMI, 2023). It is an interbedded sequence of black shale, siltstone, and sandstone and covers the northwestern corner of the state. Advances in drilling and recovery technology such as horizontal drilling and hydrofracturing have transformed the Bakken into a prolific oil and natural gas producer. According to NDLMI (2023) North Dakota's volume of oil production ranks them as the number two oil producer in the U.S., with Texas being number one.

Figure 4.2-19: Destroyed Railroad Trestle Due to Wildfire

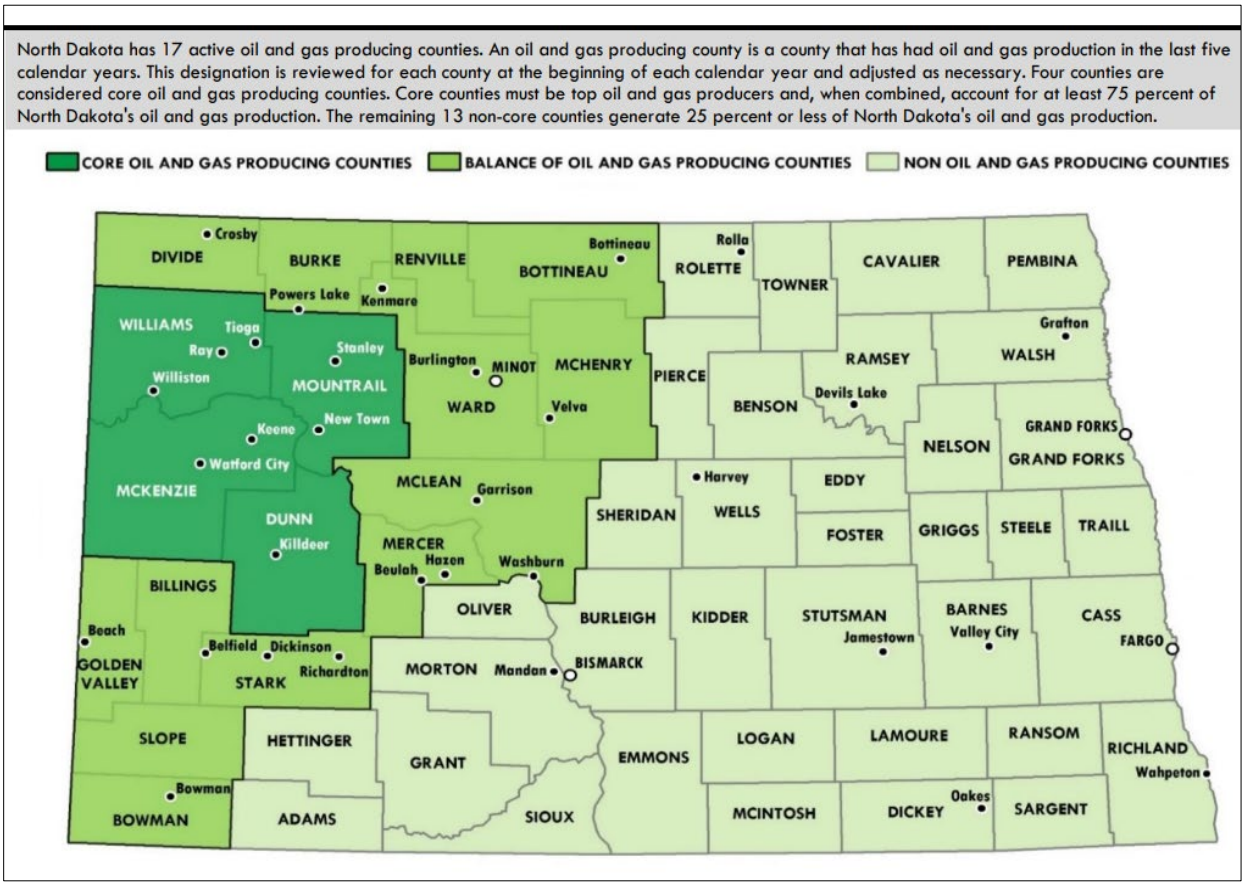
Source: The Washburn Fire Department. A fire destroyed a railroad trestle bridge near Cross Ranch State Park (April 2021).

The Oil and Gas Report from the North Dakota Labor Market Information Center (Oct. 2023) reports as of July 2023; 18,179 oil and gas wells were in production in North Dakota, which is a +0.4 percent increase from the prior month and +4.6 percent increase from one year ago. This resulted in North Dakota producing an average of 1,180,611 barrels of oil per day in July 2023, a change of +1.2 percent from the prior month and +10.1 percent from one year ago. That averages the daily gas production to 3,289,759 MCF (thousand cubic feet) in July 2023, which is also an increased change of +1.3 percent from the prior month and +5.9 percent from one year ago. Approximately 8 in 10 oil and gas wells are in the four core oil and gas producing counties (NDLMI, 2023). **Figure 4.2-20**: shows North Dakota counties as being either core oil and gas producing counties, a balance of oil and gas producing counties, or a non-oil and non-gas producing county.

May 6, 2019. A garage attached to a single-family residence on the 600 Block of 3rd St West in Napoleon caught fire. The initial call came in at 3:35 p.m. and by the time the fire department was on scene the entire building was engulfed in flames. The large garage was a good structure covered by metal. Neighbor Ed Piatz assisted with a telehandler to push down the standing charred walls. Inside the building were many flammables including oil pails and old tires. The fire department dispatched five units and 16 firefighters assisted on the call. The Napoleon Ambulance, Napoleon Police Department and Logan County Sheriff's Office also responded to the incident. Firefighters said the water used to distinguish the fire had an oily sheen, which washed down the storm drain.

(Logan County Multi-Jurisdictional Hazard Mitigation Plan, 2022)

Figure 4.2-20: North Dakota Oil Production by County



Source: North Dakota Labor Market Information Center, 2023

The volume of oil and gas produced in North Dakota is critical to the local economy and to national and international supplies. The 18,179 active oil and gas wells are critical infrastructure to the industry. These oil and gas wells that supply the actual product, along with the labor in the industry field and the supplementary labor that permits, regulates, inspects, and transports the product represent critical infrastructure for the industry. As discussed prior in the hazard profile, wildfires have historically occurred more frequently on the western side of the state, often within counties that are considered core producing counties for the oil and gas industry.

Protecting the oil and gas infrastructure from wildfires and avoiding disruption to production is critical for life safety of personnel, the quality of the environment, and the financial health and stability of the economy which is discussed in section 4.4.2.6.

Proactive options for protecting resources from wildfire hazards include a variety of mitigation activities, such as creating and maintaining defensible spaces; building with ignition resistant materials; installing fire suppression systems; proactively reducing wildfire fuel sources; and maintaining vegetation on locations of important natural, cultural, and historical value as well as locations of critical facilities and infrastructure.

4.2.2.5 Critical Facilities, Community Lifelines, and State Assets

Wildfire response operations utilize all available resources in protecting communities and critical facilities from becoming direct targets of wildfire. North Dakota has aggressively and successfully protected critical facilities and state assets from wildfire occurrences in the past; however, this is not and will not always be feasible. NDDES is the lead agency in maintaining the plan on how to continue essential functions of state service even in times of natural disaster, which is the North Dakota Department of Emergency Services Continuity of Operations Plan (COOP).

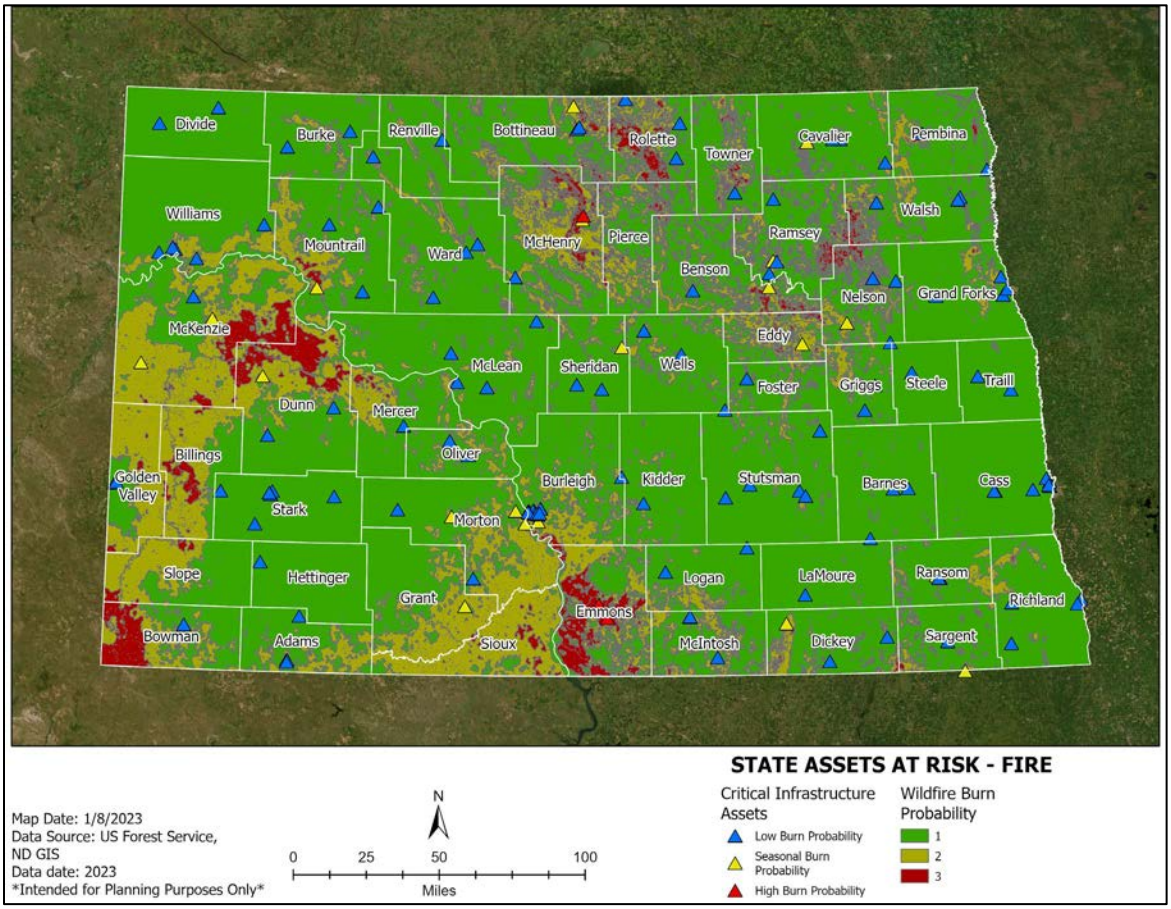
Wildfire is a concerning hazard in that it threatens all eight of the FEMA Community Lifelines: Safety and Security, Food, Water, and Shelter, Health and Medical, Energy (Power and Fuel), Communications, Transportation, and Hazardous Materials.

- **Safety and Security:** Wildfire responses are extra demanding on volunteer-based departments, need support of law enforcement to reroute traffic and evacuation routes, and threaten community safety when evacuations are required.
- **Food, Hydration, and Shelter:** Wildfire destroys crops and disrupts the raw products that start the supply-chain of food products, can cause death or dismal post-event living conditions to livestock, can deplete water supplies and can activate the need for shelter operations when communities need to be evacuated.
- **Health and Medical:** Smoke from fires creates public health challenges especially for already vulnerable or health compromised individuals and patient movement is high-stress and high-risk if wildfires directly threaten critical healthcare providing facilities.
- **Energy (Power Grid and Fuel):** Wildfire events often trigger power companies to cut power from transmitting across above-ground lines in efforts to cease arcs and fire starting and/or spreading further or to other areas.
- **Communications:** Wildfires, particularly those that spread or change direction quickly, demand rapid information spreading of alerts, warnings, and messages. Citizen users, in an effort to connect with family and friends, can overwhelm communication and 911 emergency lines can experience increased call volumes. Large events that have multiple departments responding need responder communication abilities to allow for interoperable communication capabilities.
- **Transportation:** Roadways can become congested with delayed evacuations and smoke can create slow and dangerous driving conditions. Airports can experience delays and cancellations due to poor visibility.
- **Hazardous Materials:** Wildfire events can rapidly increase in size and complexity if they engulf a facility that has or stores hazardous materials. This creates additional environmental concerns and requires additional resources with specialty training to manage the fire.
- **Water Systems:** Wildfires stress the availability of water supply to municipalities, particularly in rural locations.

Figure 4.2-21 shows state assets at risk for wildfire. US Forest Service Fire Probability data was converted for geospatial analysis to determine which assets were in the high or medium wildfire risk areas. Four state assets were in the high burn probability area, and an another 42 were located in the

medium burn probability area. In the high burn probability area, the total insured amount for at-risk assets was $396,749. Three of these assets were NDDOT Maintenance & Engineering Services facilities in Linton in Emmons County totaling $341,519, and the fourth is a North Dakota Forest Service Building in Towner (McHenry County). Of the 42 assets located in the medium burn probability area, 31 were government facilities totaling $30,526,598, nine assets were communication facilities of $419,361 in value, and the remaining two were not categorized. The total for state assets of medium burn probability is $31,018,293.

Figure 4.2-21: State Assets and Wildfire Risk

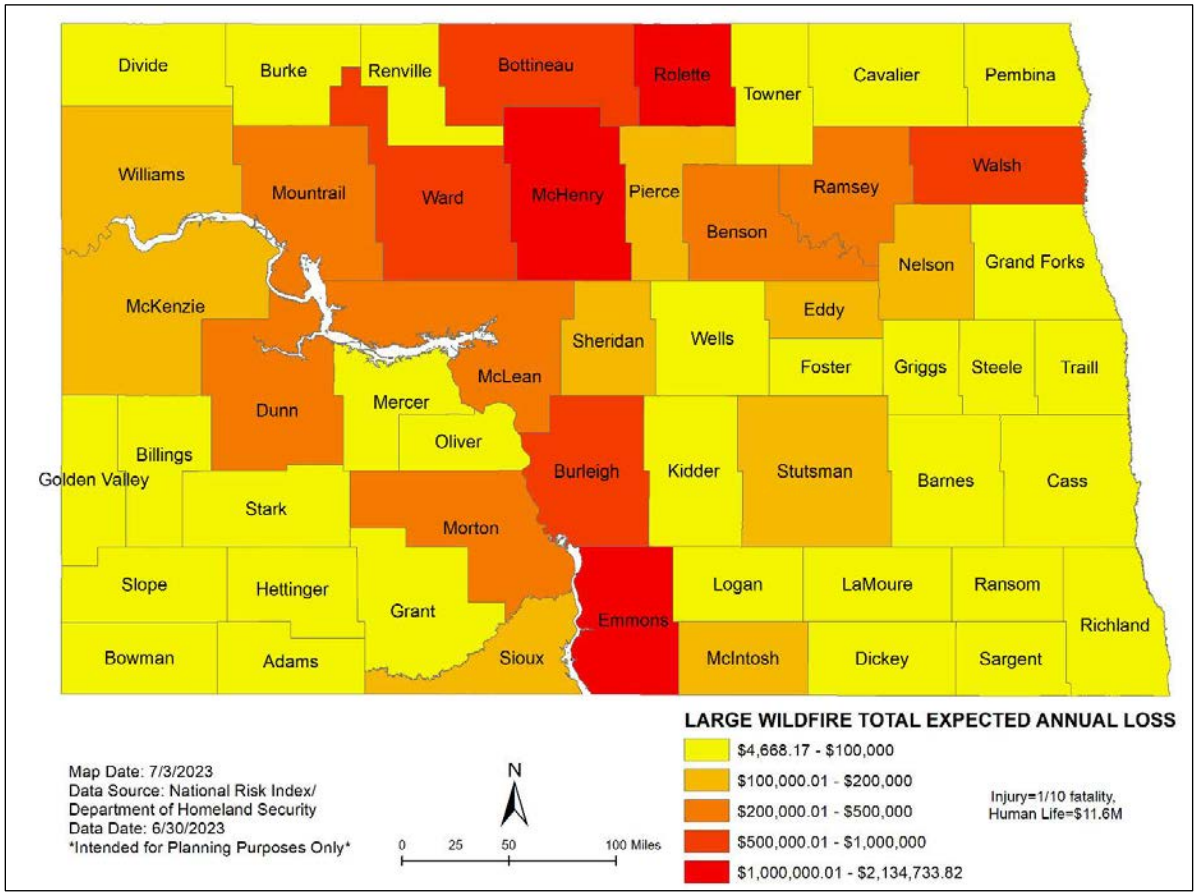


Source: U.S. Forest Service, 2022; NDGIS, 2023

4.2.2.6 State Economy and Economic Disruption

Wildfires are costly to the State of North Dakota's economy. The economic impact of wildfires depends on their location, size, duration, and severity and can be extensive. Wildfires can damage and destroy infrastructure, cause business closures, disrupt transportation and supply networks, affect employment, and alter state and local tax revenues. **Figure 4.2-22** displays annualized wildfire loss for 2021-2022 using National Risk Index data; seven counties in North Dakota could anticipate approaching or exceeding one million dollars in loss.

Figure 4.2-22: Wildfire Annualized Loss



Source: National Risk Index, 2023

Revenue from lost crops is one of the greatest economic concerns from wildfires. That is because North Dakota leads the nation in spring wheat and sunflower productions. North Dakota is also a hotbed for emerging crops like industrial hemp, hops, fava beans, and carinata. There are also acres and acres of golden wheat fields planted and harvested each year. While not plant based, but still an agricultural product, North Dakota has been the number one honey-producing state in the country for 19 years (State of North Dakota, 2023). Some economic statistics from the North Dakota Department of Agriculture (2023) that highlight how critical the agriculture industry is to local economies and the state economy include:

- Production agriculture makes up 25 percent of the state's economic base.
- Nearly one-fourth of North Dakota's workforce are farmers or ranchers or are employed in agriculture related businesses or industries.
- North Dakota's 26,000 farms and ranches occupy 39.3 million acres, which averages 1,512 acres per farm.
- In 2017, the total value of agricultural products sold was $8.2 billion. Of the total value of production, 19 percent originated from livestock and 81 percent originated from crops.

Disruption to the agricultural industry not only reduces in-state revenues but creates a ripple effect of issues in the supply chain that can be felt nationwide.

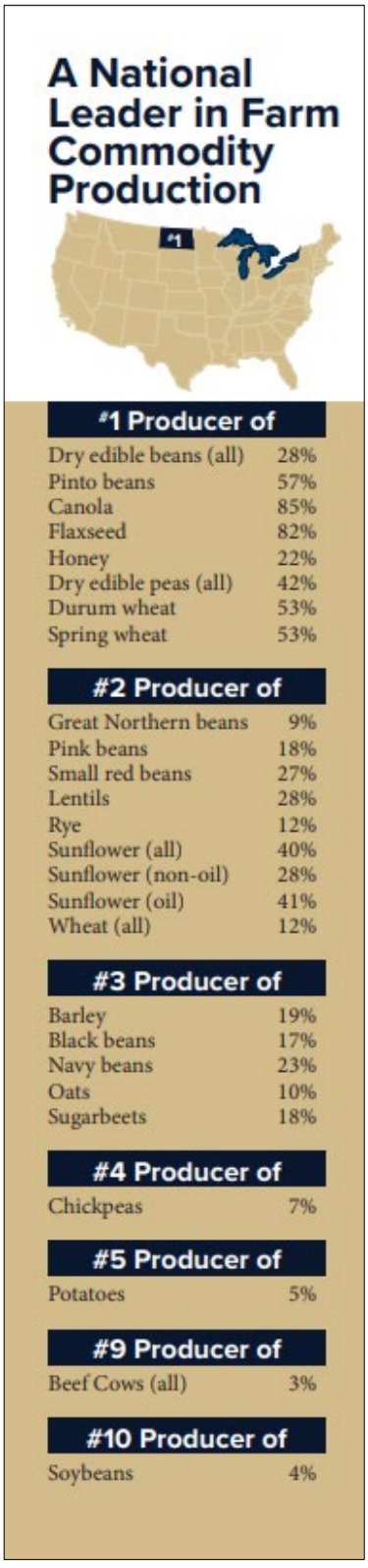
Energy and Natural Resources are other major economic sectors for North Dakota. The oil and natural gas industry in North Dakota accounted for more than $40 billion in gross business volume, nearly 60,000 jobs and over $3.8 billion in state and local tax revenues in 2019, according to a study by North Dakota State University (NDSU) researchers Dean Bangsund and Nancy Hodur (2021). Total gross business volume, which includes direct sales in the oil and gas industry and business generated from indirect and induced economic activity throughout North Dakota, was estimated at $40.2 billion. This is an increase of $7.5 billion over 2017 and more than a quarter of the state's overall business volume.

Another study, conducted for the Western Dakota Energy Association and North Dakota Petroleum Council (2022) reports from fiscal years 2008 to 2020, tax revenues from the oil and gas industry in North Dakota totaled nearly $22 billion. Those revenues supported $8.2 billion for local communities and infrastructure, nearly $1.6 billion for K-12 education, over $1.2 billion for water and flood control projects, $879 million for local transportation projects, $440 million for property tax relief and $29 million for outdoor heritage projects across the state. The report shows that every county in North Dakota continues to receive revenue derived from the state's oil and natural gas production and extraction taxes. The industry's impact will be felt across North Dakota for generations to come.

Given how vital oil and gas is to the entire state, and how much revenue is redistributed into vital public services, protecting and mitigating the oil and gas fields and infrastructure is critical to local economies and the state's economy, as well as national and international supply chains.

The tourism industry, while significantly smaller than agriculture and oil and gas, is North Dakota's third largest industry (State of ND, 2023). The state offers amazing views, limitless recreational explorations, and festive events year-round. All the outdoor wonders North Dakota has to offer visitors are compromised during times the state is impacted by wildfire occurrences and their effects that can create unsafe and challenging conditions. This can negatively affect the tourism industry.

Figure 4.2-23: Agricultural Production Statistics



Source: ND Dept. Of Agriculture, 2022

Figure 4.2-24: Sully Creek State Park

Source: North Dakota Department of Tourism

4.2.2.7 Delivery of Service and Continuity of Operations

The NDFS is organized under the North Dakota Board of Higher Education and has been a part of the higher education system for over 100 years. The agency is administered by a State Forester who reports to the President of North Dakota State University at Fargo (Claeys, 2023). It is the North Dakota Forest Service programs that support the state's fire departments, which are essential for enhancing firefighting capabilities and public safety.

The North Dakota Forest Service programs provide rural fire departments with cost-share funds for organizing, training, planning, suppression resources, and purchasing fire equipment. For example, NDFS staff provide local fire departments with Incident Command System (ICS) course training, fire suppression tactics, radio communications, and wildland fire saw operations to name just some of the training topics available. The North Dakota Forest Service administers grant programs such as the Cooperative Fire Protection Assistance Grant which provides funds that can be spent towards vehicle purchases, equipment, personal protective equipment, fire awareness, and prevention outreach efforts. NDFS, in cooperation with the USDA Forest Service, also provides fire danger signs to eligible rural fire departments to increase public awareness of the current wildfire risk in their area.

Figure 4.2-25: An NDFS Fire Danger Sign

Source: North Dakota Game and Fish Department

Granville Mitigation Action: Purchase ATVs with water tanks for grass fires around CRP fields.

(McHenry County Multi-Jurisdictional Hazard Mitigation Plan, 2018)

The North Dakota Forest Service has seven field office locations: Lisbon, Bismarck, Carrington, Towner State Nursery, Walhalla, Bottineau, and NDSU – Fargo.

The State of North Dakota is well positioned to maintain continuity of State operations during wildfire hazard incidents. Multi-department planning has been done across all state agencies to ensure plan integration in recognizing threats and identifying hazards (through the NDDES Enhanced State Hazard Mitigation Plan). The North Dakota State Emergency Operations Plan provides a systematic, coordinated approach to emergencies or disasters occurring within the state and the North Dakota Continuity of Operations Plan plans for continuity of essential functions and services under all circumstances.

4.2.2.8 Public Confidence in the State's Governance

Wildfires present communication difficulties when fire and local officials want to interact with the public due to nature of the hazard being in more sparsely populated areas such as open, undeveloped land like pasture grazeland or in public owned land like state forests and parks. The limited population in these areas may not accurately convey the magnitude of a wildfire occurrence and could delay actions in more densely populated areas where the risk is not impacting daily activities and routines. Residents may not be as prompt to recognize and react to the threat.

The lack of urgency to take protective measures may affect the issuance of evacuation warnings from community and public safety officials. Rarely do residents comply with evacuation recommendations swiftly and at the point of first notification. Residents self-monitor and assess their personal situation and if they do evacuate, it is when the threat has significantly escalated based on previous events.

Delayed and late evacuations can result in individuals driving in conditions with decreased visibility from smoke and on congested roadways. In rural and remote communities, the number of egress and ingress roads for evacuation routes can be limited, and if the roads are only wide enough to accommodate single-lane traffic flow, evacuation movement can be slow. Drivers that waited to evacuate can also be under emotional distress and panic, creating additionally challenging evacuation conditions.

Figure 4.2-26: North Dakota Forest Service Crew

Source: North Dakota Forest Service (n.d.). One NDFS fire crew during a prescribed burn at Mount Rushmore National Memorial

North Dakota has recently had challenging evacuation events due to wildfires. In April of 2021, the quaint tourist town of Medora, located on the doorstep of Theodore Roosevelt National Park, had to evacuate the roughly 100 residents that reside there. Medora is the only incorporated town in Billings County, sits at an elevation of 2,267', and has one main road connecting it to North Dakota's Interstate 94. Later in August of 2021, a rapid response wildfire incident caused the small town of Carpio, located in Ward County, to issue evacuation orders for the entire town of roughly 150 residents. At around 2:00 p.m. a call for a fast-moving and fast-growing fire along North Dakota Highway 52 triggered public safety officials to issue immediate evacuation notifications over multiple media outlets, including social media and Reverse 911, evacuating all residents. Multiple Fire Departments responded quickly and by 5:00 p.m. the same day residents were notified it was safe to return to their homes. This event demonstrates how quickly a situation can both escalate and recede and does not allow for residents to disregard the notifications from public safety officials.

Wildfires are challenging events to the State of North Dakota; however, the state continues to successfully manage wildfire incidents as they occur through ongoing support, resourcing, and training to the departments statewide. The public maintains a high level of confidence in state leadership regarding fire management, and those who represent public safety at the state level are well respected.

4.2.2.9 Estimation of Annual Losses

The Department of the Interior and the U.S. Forest Service have spent $1.8 billion per year on fighting wildfires since 1985, which amounts to a total of $67 billion, or $18,099 per fire (ValuePenguin, 2023). The cost of fighting wildfires has gone up substantially since 1985. The government spent $2,905 per wildfire in 1985. In 2021, it cost 25 times as much to put out a single fire, at $74,409 (ValuePenguin, 2023). As each year passes, it can be assumed that the cost of firefighting will continue to increase.

National Centers for Environmental Information (NCEI, 2023) reports fifteen states had over $1 million of property damage due to wildfires in the five-year period of 2018-2022; while North Dakota was not a state that exceeded the $1 million threshold, the impact of annual losses is still significant to a state that is predominantly rural. It is likely that North Dakota should expect more frequent, larger, and more intense wildfires; given the trajectory of wildfires for North Dakota, it can also be assumed that North Dakota is at risk of breaching the $1 million in property related damages due to wildfires.

4.2.2.10 Community Resilience

Created in 1944, the Smokey Bear Wildfire Prevention campaign is the longest-running public service advertising campaign in U.S. history, educating generations of Americans about their role in preventing wildfires. One of the world's most recognizable characters, Smokey's image is protected by U.S. federal law and is administered by the USDA Forest Service, the National Association of State Foresters, and the Ad Council. Despite the campaign's success over the years, wildfire prevention remains one of the most critical issues affecting our country. Smokey's message is as relevant and urgent today as it was in 1944. Smokey's original catchphrase was "Smokey Says – Care Will Prevent 9 out of 10 Forest Fires." In 1947, it

became "Remember... Only YOU Can Prevent Forest Fires." In 2001, it was again updated to its current version of "Only You Can Prevent Wildfires" in response to a massive outbreak of wildfires in areas other than forests and to clarify that Smokey promotes the prevention of unwanted and unplanned outdoor fires versus prescribed fires.

Smokey is a character utilized by the North Dakota Forest Service and fire departments across the state to promote wildfire prevention. Messaging to help locals and visitors practice campfire safety including how to thoroughly extinguish a campfire, firework safety around the holidays, and home maintenance fuels reduction are all topics the iconic bear can be seen promoting throughout the year.

Figure 4.2-27: Smokey Bear Wildfire Prevention Campaign

Source: Smokeybear.com. Stone of the 2019 "Smokey" advertisements, which was the 75th anniversary of the campaign.

4.2.2.11 Future Conditions

Through the end of this century North Dakota can expect more frequent, larger, and more intense wildfires, with increasing frequency and/or longer duration of high wildfire (danger) potential periods. **Figure 4.2-28** is based on information extracted from the NOAA National Centers for Environmental Information, summary for North Dakota (Frankson, 2022), the Fifth National Climate Assessment (Knapp, 2023), and related resources.

Figure 4.2-28: ND Multi-Hazard Annual Operating Plan (MAOP) Baseline Assessment, 2024-2028

Condition	Projected Change through CY2100
Location	The areas at risk of wildfires remained static through much of the past century but are projected to increase as populations shift and/or oil and gas development continues.
Extent/Intensity	Wildland fire extent/intensity is projected to increase with increased air temperatures, airmass instability, burn area size, and increased drying of vegetation.
Frequency	Increases in temperatures and the frequency of droughts have and will likely continue to increase the frequency of wildland fire.
Duration	Changes in seasonal temperatures and precipitation patterns can significantly affect wildland fire conditions. Fire season across North Dakota generally runs from March 1 through October 31, and generally coincides with the respective snow-free periods of each region in any particular year. Less snow and warmer temperatures outside of core winter months could increase season length. Higher evaporative stress (less rain and more summer heat) could prolong fire conditions throughout the warm season.

In the Three Affiliated Tribes Tribal Plan (2018), communities are increasing in size to accommodate a growing oil industry. Growth has expanded into the wildland urban interface (WUI) areas, especially near the Missouri River and in the Western Segment where wildfires are more common. Nearby Williams County (2017) is also seeing growing residential communities in areas where wildfires can do significant damage, estimating that up to 60 percent of Alamo, 40 percent of Epping, and 20 percent of Grenora could be burned in a wildfire. Campgrounds along the Missouri River may also be at risk. The

expansion of oil development in Williams County and nearby areas also increases the possibility that a fire could start because of increased flaring, construction and transportation related to oil production and residential construction.

Northwest McLean County (2022) is still sparsely settled, but prone to wildfires and seeing increased population growth. In the Turtle Mountains, Rolette and the Turtle Mountain Band of Chippewa Indians (2023) recognize increased fire risk in the communities of Dunseith, Mylo, Rolette, Rolla and St. John, all of which have a high birth rate and growing populations. In Hettinger County (2019), 98 percent of fire calls are for hay or wildland fires, where about 50 percent of controlled burns become uncontrolled. These fires are typically in grasslands that are easily handled by fire fighters. But the county's rural wooden bridges are at risk, and there are adopted building codes, but no enforcement mechanisms, leaving sub-standard development that is more at risk for a variety of hazards, including wildfires.

4.2.2.11.1 Extreme Climate Variability and Climate Change

Through the end of this century North Dakota's natural yet extreme climate variability will likely continue to be the primary influencer or signal within each of the natural hazards which directly or indirectly impact jurisdictions and peoples across the state, over days to decades long timescales (Knapp, 2023). And the much more subtle and gradual trends of climate change over the rest of this century may act to further extend the range of such variability beyond that which has previously been documented in the historical record.

Recent climate change trends have shown, and future projections suggest that the state can expect continued gradual warming in all seasons, with greatest warming in the winter season. Overall precipitation is likely to increase, but with a high degree of inter-seasonal and interannual variability, which could lead to longer and stronger droughts interspersed with more frequent and more intense flooding (Swain & Hayhoe, 2015). Severe summer and winter season storms will likely continue to occur in both drier, drought-prone periods, and wetter, flood-prone periods within the state's overall extreme climate variability.

- **Location:** Previous studies have shown that the areas at risk for wildland fires have been consistent over the past century or so, based on well-established patterns of population centers, cropland, grassland, and forests (Kotchman, 2010). As noted by Claeys (2020), more recent studies note that early 21st century shifts in population across ND have accompanied increases in oil and gas exploration over the same period, with an increased wildland urban interface (WUI) and wildland oil and gas interface (WOGI) adding complexity to the associated fire hazards across much of the state.
- **Extent/Intensity:** Much as droughts are expected to increase in extent and intensity, the same future climate conditions will likely contribute to increased negative impacts on forest health from insects and disease (Claeys, 2020), while simultaneously increasing the wildfire risk (Littell et al., 2016), and wildfire season length (Westerling, 2016). In addition, burn scars can act to increase the number of probable ignition sites for new fires, as nearby vegetation dries, while decreasing the capacity of soils to absorb and store future rainfall (Littell, 2016). Note that the Haines Index (Wikipedia: Haines Index, 2023), a measure of potential extreme fire growth, is based on the rate of change of temperature and moisture from low to mid-levels of the atmosphere and should generally increase under projected conditions of increased drought.

- **Frequency:** Fire potential as well as the behavior of individual fires is determined by the set of fire weather variables that include standard atmospheric elements such as temperature, humidity, wind direction and speed, along with various atmospheric processes which include the production of precipitation (Liu et al., 2013). Fire potential indices, such as the Keetch-Byram Drought Index (KDBI) are projected to increase on average by roughly half a category for winter and spring seasons (from low to low-mid), and nearly a full category for summer and fall seasons (from low-mid to mid-high), for the mid to late 21st century period, relative to 1971-2000 values. The National Fire Danger Rating System (NFDRS) and the Fire Danger Rating, which integrate these or similar indices, are likely to show similar increases (WFAS, 2023). The negative impacts from higher projected temperatures are expected to significantly outweigh any benefits gained from projected increases in precipitation, especially in the summer and early fall (Lui, 2013).
- **Duration:** Changes in seasonal temperatures and precipitation patterns can significantly affect wildland fire conditions. Fire season across North Dakota generally runs from March 1 through October 31, and generally coincides with the respective snow-free periods of each region in any particular year. On average, the snow-free period is longest in southwest ND and shortest in northeast ND, where winter snow-cover is typically most extensive and prolonged.

Spring fuel arrangement is heavily influenced by winter snowpack (Thompson, 2023, personal communication). A low snow winter leaves much of the grassland with vertical stems and leaves, and a more easily burnable aspect. Heavier snow winters will tend to flatten the grasses, making them less easily burnable.

The inverse of a snow-free period would be the seasonal snow-cover period, or the typical length of time that a near-continuous (fewer than 5 missed days) snow cover is present over any region of the state. Extensive snow cover generally will put an end to the wildfire season, though areas of peat (Cobb, 1917) and the petrified peat/lignite beds across western ND (Beechie, 2004; Bluemle, 2023), are known to continue burning under snow cover. **Figure 4.2-29**: indicates the variations across the four quadrants of the state in minimum, average, and maximum snow cover periods, based on the 1948-2023 period.

Figure 4.2-29: Seasonal Snow Cover

A comparison of seasonal snow-cover for the climate reporting stations in Williston, Bismarck, Fargo, and Grand Forks, from 1948 through 2023 (xmACIS2, 2023), shows the following for the minimum, average, and maximum in *near*-consecutive days of snow-cover greater-than or equal-to 1 inch (more than Trace), through an entire winter season:

	Minimum	Average	Maximum
Williston…	59 days, 1987-88;	149 days;	200 days 1959-60
Bismarck…	66 days, 1954-55;	142 days;	198 days, 1959-60/1990-91
Fargo…	78 days, 2011-12;	143 days;	202 days, 2012-13
Grand Forks...	104 days, 2009-10;	148 days;	199 days, 2012-13*

**Note: Grand Forks is missing portions of the snow-cover data for the winter of 1997-98.*

Although the average number of snow-free/snow-cover days in a winter season only varies by about a week, across the four quadrants of the state, the range in minimum snow-cover/maximum snow-free days varies by nearly a factor of two from western portions of the state to the northeast corner. The droughts of 1954-55, 1987-88, and 2011-2012 stand out for their short periods of snow-cover over all but the northeast corner of the state.

4.2.2.11.1.1 Impacts

Impacts of wildfire can include some of the characteristics of short-term drought, such as withering vegetation, soil cracks, and areas of wind and water erosion (from brief and small-scale heavy rainfall episodes). There can also be characteristics of longer-term drought, such as deep soil cracks and more widespread desiccation of vegetation, along with more widespread water shortages, as the same conditions of high temperatures and low precipitation give rise to conditions that promote both drought and wildfire (Liu, 2013). Wildfire, like drought, influences various economic sectors (Koudenoukpo, 2023). And increased wildfire size, intensity, frequency, and/or duration could lead to increased economic impacts.

Rangeland/grassland impacts. In the absence of snow-cover, wildfires are controlled by the available biomass, its dryness, a source of ignition, and the ability of weather to spread the fire (Clark et al., 2020). A future climate where especially hot and dry conditions or seasons more often follow wet periods with abundant vegetative growth would be most conducive to the growth of large wildfires.

> [Foster County residents] said CRP is coming out of service which has reduced the occurrences of wildland fire, and that flooding causes natural firebreaks. As a result, wildland fire has become less and less of an issue.
>
> *(Foster County Multi-Jurisdictional Hazard Mitigation Plan, 2021)*

During periods of protracted, multi-year drought, wildfire occurrence tends to be more aggressive during the first year but is reduced in subsequent years as available biomass is steadily diminished.

As Fire Management Officer, Ryan Melin states, “What is most concerning is the potential for an earlier snowmelt, even a snow-free winter, an early spring start, with low spring/summer rain, and an increasing incidence of an ‘entire fire year.’ Our worst-case scenario in North Dakota is if the previous year was wet, with abundant grass growth – like we had from the wet summer-fall 2020 into the drought of 2021. In contrast, 2017 into 2018 didn’t produce as bad of a wildfire year, since there was less grass growth through summer-fall 2017, resulting in less fuel load and fewer large fires during the drought of 2018. As fire-managers (in the U.S.), we used to talk about our three distinct fire seasons… spring pre-green-up, late summer (grass/crop-ripening), and fall seasons. And now we talk about the potential for an entire fire year, like 2021, where the fire season continues throughout the (snow-free) year” (Melin, 2023, personal communication).

Forest impacts. In nature, fire is one of the main/historic methods of maintaining aspen and oak forest health, by periodically thinning overgrown areas, eliminating pest infected/damaged areas, and otherwise encouraging vigorous regeneration (Claeys, 2020). Ponderosa pine forests in southwest North Dakota are likewise overly dense and prone to pest damage, but generally resilient.

Fire feedback to drought. Smoke: Smoke aloft can reduce temperatures near the surface as smoke particles can both scatter and absorb solar radiation. GHGs: the production of carbon dioxide and black-carbon from wildfires contributes to longer term atmospheric carbon-cycle impacts. Land Cover Change: burn scarred soils absorb less rainfall, while destroyed vegetation leads to less canopy capture of solar energy and less transpiration, with a net effect of increased runoff (Williams et al., 2022) and reduced overall evapotranspiration from the landscape (Littell, 2016).

4.2.2.11.1.2 Adaptation

No specific adaptation actions are identified as relates to future climate projections. Typical wildfire adaptation/prevention activities would still apply.

4.2.2.11.1.3 Mitigation

With a potential for increased wildfire size, intensity, frequency, and/or duration there should be an increased emphasis on longer-term mitigation strategies which reduce exposure to both drought and wildfire, and strategies that minimize cascading effects like burn scars increasing subsequent flash flood risk (OECD, 2023). These include:

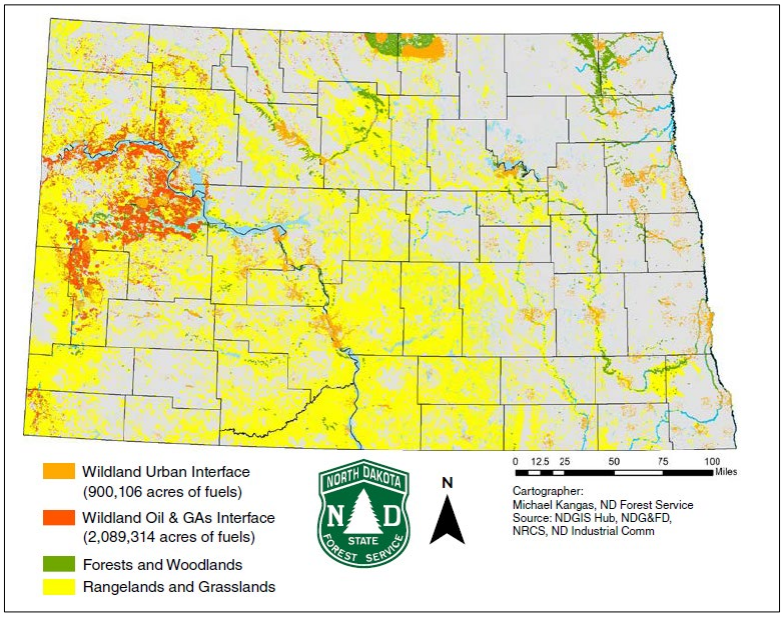
Healthy Ecosystems and Wetlands. A healthy ecosystem is one that is sustainable, in that it can maintain its productivity/vigor and structure/organization over time/resiliency (Costanza, 1999). This was best expressed by Dr. Owen McKenna's comment, "*When combined, our results suggest areas in the Prairie Pot-Hole Region that currently support the highest densities of intact wetland basins, and thus support the largest numbers of breeding-duck pairs, will likely also be the places most critical to maintaining continental waterfowl populations in an uncertain future"* (McKenna, 2023, personal communication; McKenna et al., 2021).

Fuel Management. In most cases, thinning, clearing of debris, and prescribed burns can help to create healthier and more fire-resistant forest conditions, while reducing the risk of catastrophic wildfire, especially under current and potential future climate conditions (Johnson, 2021), and similarly for rangeland/grassland areas (Melin, 2023; OECD, 2023).

Land-use and Building Regulation. Counties and Communities should enact unified building and/or zoning codes that specify non-flammable materials and building techniques appropriate to their current and future wildfire risk (OECD, 2023).

Figure 4.2.30 from Claeys, 2020, shows the areas in the state forest and rangelands occur, and where they interface with urban populations and the Oil and Gas Industry. These interface areas are likely to increase in the future.

Figure 4.2-30: Statewide Wildland Interface



Source: Claeys, 2020; NDGIS Hub, 2023

Wildfire Risk Governance. FEMA encourages a Whole-Community Approach to Emergency Management which recognizes that a government-centric approach to disaster management is not enough to meet the challenges posed by a catastrophic incident, now or in the future (FEMA, 2011). And that is why we must fully engage our entire societal capacity to prevent future catastrophic fires (OECD, 2023).

Vulnerable Populations. Populations that are vulnerable to wildfire could include the young, the old, rural, or urban. They include people who can't or won't control the start of wildfire or the spread of wildfire and those who may not report or escape from wildfire due to any number or reasons including their ability to communicate clearly in English, who lack mobility, and/or who lack modern and resilient communications systems (Chavez et al., 2020).Though managed fire may be essential to the preservation of prairie health, wildfire can be disastrous to landscapes, native cultural resources, and rural communities.

4.2.2.11.2 Other Changes

Cascading impacts are those that are exacerbated by either sequential or coincidental factors, either natural or anthropogenic in origin (Crausbay, 2020). Both drought and flood can cause or contribute to cascading impacts in ecological environments and human communities, including those that are primarily driven by natural conditions and those that may be human-induced and/or human-modified.

The urban areas of the state are anticipated to have a 24.6 percent growth rate between 2020 and 2040 (U.S. Census Bureau, 2020). Areas in and near Fargo, Grand Forks, Bismarck, and Williston will see more infill development and development on their fringe and nearby smaller communities, increasing the amount of property and people potentially exposed to wildfires.

The Western North Dakota Counties of Dunn, McKenzie, Mountrail, and Williams have grown at a rate of 72.3 percent since 2010 (U.S. Census Bureau, 2020), and growth is expected to continue at a rate of 54.9 percent. This has already led to new development in areas like Williston, Minot and Dickinson and the rural areas between them. Accommodating the booming oil and gas workforce and their young families will increase development and critical infrastructure in these areas, placing more people and property at risk from harm from wildfires.

Many rural counties in North Dakota outside of the Bakken have been losing population. The 20 counties which have lost population since 2010, have lost an average of 3.4 percent (U.S. Census

Bureau, 2020). While this decrease in population may remove people and property from direct harm, it also reduces the availability of volunteers for responder roles and reduces the number of neighbors available to observe the impacts of fires.

4.2.3 Risk Analysis

Most wildfires have occurred in the sparsely developed area in Northwest McLean County.

(McLean County Multi-Jurisdictional Hazard Mitigation Plan, 2022)

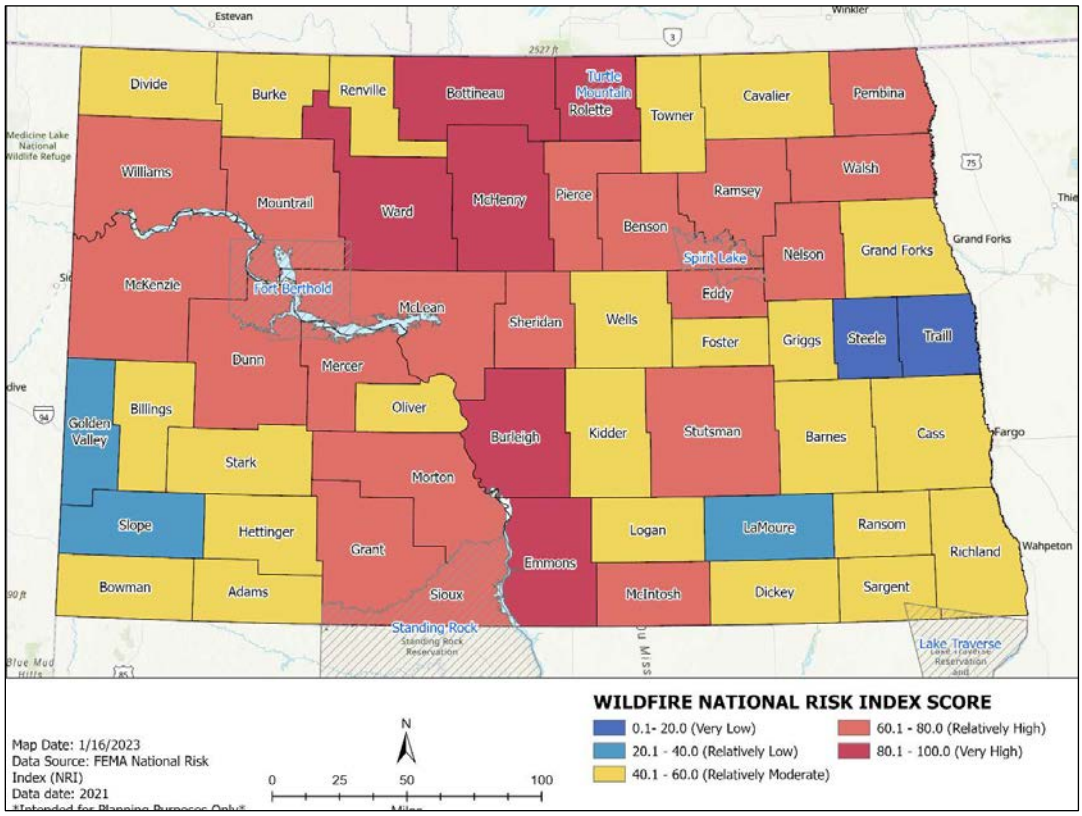
Risk can be defined as the potential for loss of or damage to an asset (FEMA EMI, 2023). This section analyzes the potential for loss or damage in the state of North Dakota.

4.2.3.1 National Risk Index

The National Risk Index leverages available source data for natural hazard and community risk factors to develop a baseline risk measurement for each United States County and Census tract. The risk equation behind the Risk Index includes three components: a natural hazards component (Expected Annual Loss), a consequence enhancing component (Social Vulnerability), and a consequence reduction component (Community Resilience). The dataset supporting the natural hazards component provides estimates measured in 2022 United States dollars. The datasets supporting the consequence enhancing and consequence reduction component have been standardized using a minimum-maximum normalization approach prior to being incorporated into the National Risk Index risk calculation. Using these three components, composite Risk Index values and hazard type Risk Index values are calculated for each community (county and Census tract) included in the Index. Risk Index values form an absolute basis for measuring Risk within the National Risk Index, and they are used to generate Risk Index percentiles and ratings across communities. Categories of risk are determined by using quintiles to determine categories, where 0-19.99 are low risk, etc.

North Dakota's Wildfire National Risk Index Score shows that the risk for wildfire is unevenly distributed statewide, as shown in **Figure 4.2-31**. The highest risk can be seen clustered in the north-central and south-central counties of the state to include Bottineau, Rollette, Ward, McHenry, Burleigh, and Emmons counties. The next highest tier of risk forms a solid band running from the northwest to the northeast to also include some south-central counties. Overall, only two counties, Steele and Traill, rank as having the lowest risk on the Wildfire Risk Index Score.

Figure 4.2-31: National Risk Index – Wildfire



Source: National Risk Index, 2023

4.2.3.2 Risk Index Score

The Priority Risk Index for this plan update ranks fire as a critical risk with a score of 3.5. Fire is ranked as the second most concerning hazard out of the 15 total hazards assessed.

4.2.3.3 Jurisdictions at Risk

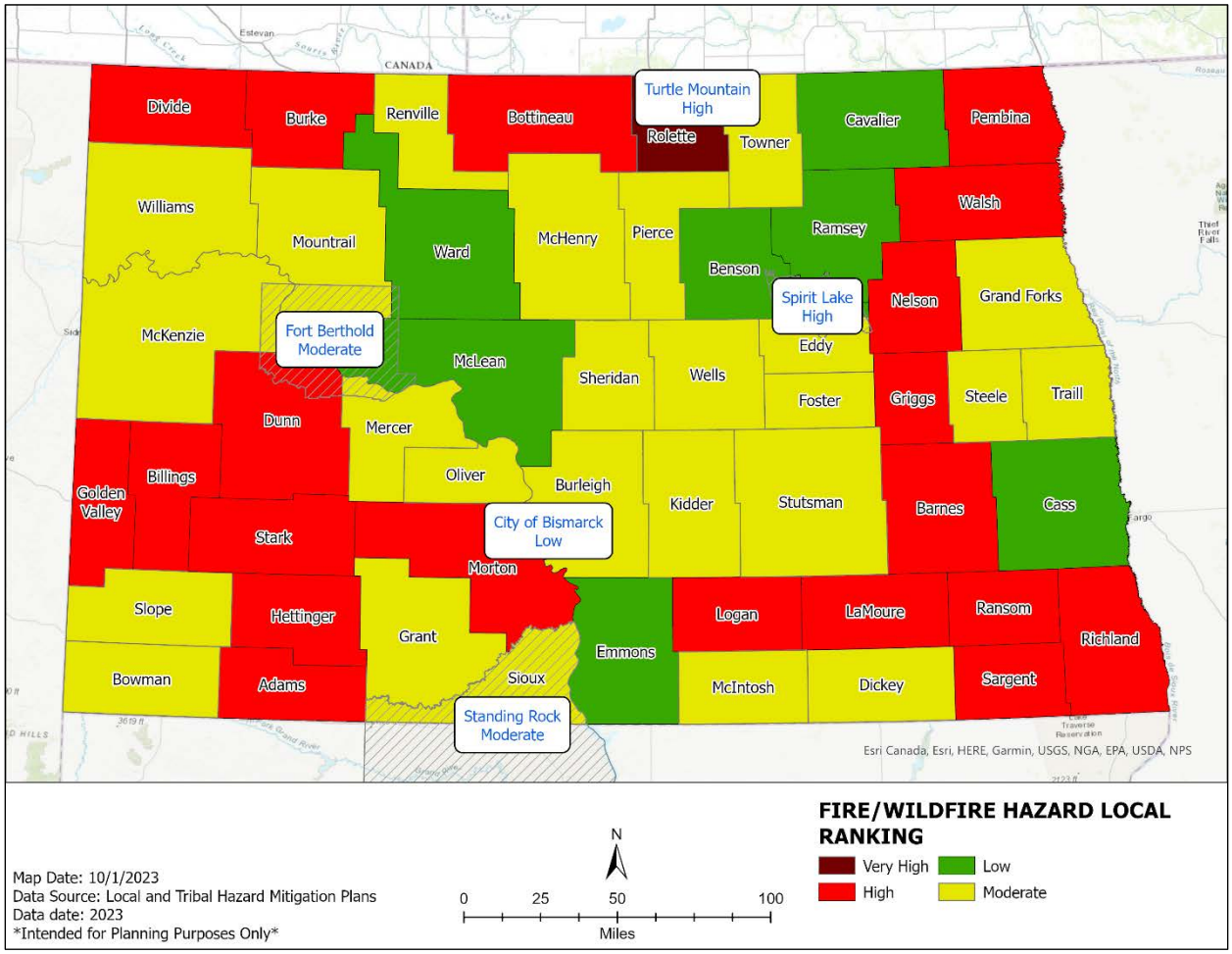
Local jurisdictions also identify and assign hazards as low, moderate, high, or very high regarding priority for the community. Fire defined at the local level includes both wildfire and urban fire and is identified as a hazard in all 58 local hazard mitigation plans. Of the 58, most counties rank fire as a moderate or high priority. **Figure 4.2-32** displays how local counties across the state ranked the priority of wildfire within their plans and **Figure 4.2-33** shows this prioritization across the state with a map.

Figure 4.2-32: Local/Tribal Mitigation Plan Wildfire Risk Prioritization

Local Mitigation Plan Fire Risk Prioritization	Number of Community Plans
Low	8
Moderate	27
High	22
Very High	1
Not Mentioned	0

Source: State of North Dakota, 2023

Figure 4.2-33: Local/Tribal Mitigation Plan Wildfire Risk Prioritization Map



Source: State of North Dakota, 2023

4.2.3.4 Fire Management Assistance Grants

The Fire Management Assistance Grant (FMAG) Program replaced FEMA's Fire Suppression Assistance Program when Section 420 of the Stafford Act was amended by the Disaster Mitigation Act of 2000, Public Law 106-390, and is effective for all fires declared on or after October 30, 2001 (FEMA, 2023). When an uncontrolled fire on public or private forest or grassland is such a threat that, in the opinion of the on-scene commanders or other government officials, the fire threatens such destruction that would constitute a major disaster, the Governor may request assistance from the FMAG Program. The Governor submits a FMAG request while the fire is actively burning and considered uncontrolled with factual data and professional estimates to the FEMA Regional Administration (Region VIII) and the Regional Administrator is authorized to evaluate the request and decide within several hours.

4.2.3.5 Past Fire Management Assistance Grants

North Dakota received a Fire Suppression Assistance emergency declaration, FSA-2435-ND, in 2002 for the Again Fire that burned land in Sioux County and Standing Rock Sioux Reservation and threatened the community of Shields. According to FEMA, North Dakota has not received an FMAG declaration to date.

North Dakota's Medora Fire in 2021 saw the initial filing steps of requesting an FMAG occur; however, the situation did not escalate to the threshold to formally pursue the declaration.

4.2.3.6 Administrating Fire Management Assistance Grants

NDDES will provide oversight for the administration of any FMAG declaration. Despite not yet having experienced an FMAG, the NDDES has proactively prepared and established the response framework. The FMAG Request Checklist identifies crucial decision elements in the FMAG declaration process and provides contact information; outlines criteria and steps if conditions meet or have realistic potential to meet declaration criteria; identify primary and alternative Governor's Authorized Representatives (GAR) includes blank templates, such as the O.M.B. Form No. 1660-0058; and includes a staffing and assignment activation matrix for expedited stand-up of operations.

NDDES, North Dakota Forest Service, Burleigh County and Bismarck Emergency Managers, and FEMA have also taken proactive measures to exercise this procedure, as recently as February 2023, to ensure effective and efficient response should the need for an FMAG declaration arise. The NDDES training officer developed a scenario of a south Bismarck fire that threatened General Sibley {ark, multiple subdivisions, and cut off access to the Missouri River Correctional Center. Through the exercise, participants communicated through normal channels, contacted the FEMA Mobile Emergency Response System Operations Center (MOC), and developed the FMAG declaration documents that were approved later that day by the Region VIII Regional Administrator.

4.2.3.7 Hazard Mitigation Grant Program Post Fire Grants (HMGP Post Fire)

HMGP Post Fire assistance is available to help communities implement hazard mitigation measures after wildfire disaster in any area that receives a FMAG declaration (FEMA, 2023).

Section 1204 of the Disaster Recovery Reform Act of 2018 amended Section 404 of the Stafford Act to allow FEMA to provide HMGP Post Fire assistance for hazard mitigation measures that substantially reduce the risk of future damage, hardship, loss or suffering in any area affected by a fire for which assistance was provided under Section 420 of the Stafford Act. Therefore, unlike HMGP, the availability of HMGP Post Fire assistance is not contingent on a major disaster declaration and is instead triggered by an FMAG declaration.

4.2.3.8 Past Post Fire Hazard Mitigation Grant

According to FEMA, the State of North Dakota has not received a HMGP Post Fire Grant to date.

4.2.3.9 Administrating Post Fire Hazard Mitigation Grant

The NDDES as a recipient of HMGP Post Fire Grant Funds, must prepare an HMGP Administrative Plan approved by FEMA. The HMGP Administrative Plan is a procedural guide that details how the state will administer the HMGP Post Fire awards.

North Dakota updates their Administrative Plan on an annual cycle in cadence with the calendar year, and it collectively covers both HMGP and HMGP Post-Fire. The State's goals for implementation of the

HMGP Post Fire funds align with the prioritization as set forth with FEMA's programmatic doctrine, which includes:

- Wildfire mitigation activities within the burned, declared counties.
- Mitigation activities within the burned, declared counties.
- Wildfire mitigation activities beyond the burned, declared counties (open to statewide)
- Mitigation activities beyond the burned, declared counties (open to statewide)

The NDDES does not limit or restrict the 5 Percent Initiative Funding sub-application project types or direct the funding to achieve any specific state mitigation goals.

4.2.4 Urban Fire

4.2.4.1 Overview

4.2.4.1.1 Description

In contrast to wildland fires or wildfires, urban fires are fires that occur in developed areas that are unplanned and out of control. Colloquially, these are the typical fires when local fire departments would respond as shown in **Figure 4.2-34**.

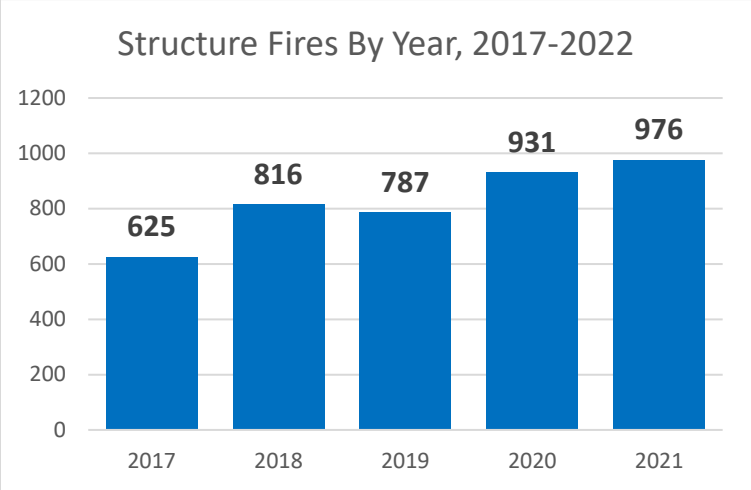
Figure 4.2-34: Mobile Home fire in Minot, 2021

Source: Schramm, Minot Daily News, 2021. Reprinted with permission.

4.2.4.1.2 Previous Occurrences

Each year, fire departments across the state will respond to several hundred structure fires. **Figure 4.2-35** shows data from NFIRS and reports the counties with the greatest number of structure fires spanning the years from 2017 to 2021. Unsurprisingly, **Figure 4.2-36** shows the nine counties with the most frequent fire occurrences are also nine of 11 counties in the state with the highest populations.

Figure 4.2-35: Total Structure Fire Per Year, 2017-2022



Source: NFIRS, 2023

Figure 4.2-36: Leading Counties for Structure Fires, 2017-2021

County	Structure Fires
Cass	728
Burleigh	411
Ward	363
Williams	294
Rolette	258
Stark	244
Morton	234
Grand Forks	194
McKenzie	155

Sources: NFIRS 2023

4.2.4.1.3 Location and Extent

Urban fires are the fires that occur anywhere in the collective built environment. These locations can be residential dwellings such as single-family homes, mobile homes, or multi-unit apartment complexes; commercial locations, such as small businesses and shops, restaurants, retail stores; recreational venues, such as gyms or movie theatres; or large-scale production sites, such as manufacturing plants or processing centers. The extent of urban fires relates to fire safety mindset and preparedness. Some examples to increase fire safety preparedness include individuals and families practicing home fire safety skills; businesses promoting a culture of workplace safety beyond what is required per State Fire Codes; and larger facilities or facilities that have higher fire risks due to work performed or materials on site (such as hazardous materials) enforcing strict safety protocols to increase protection within the environment. While urban fires occur frequently, the extent remains localized, as evidenced by **Figure 4.2-37**.

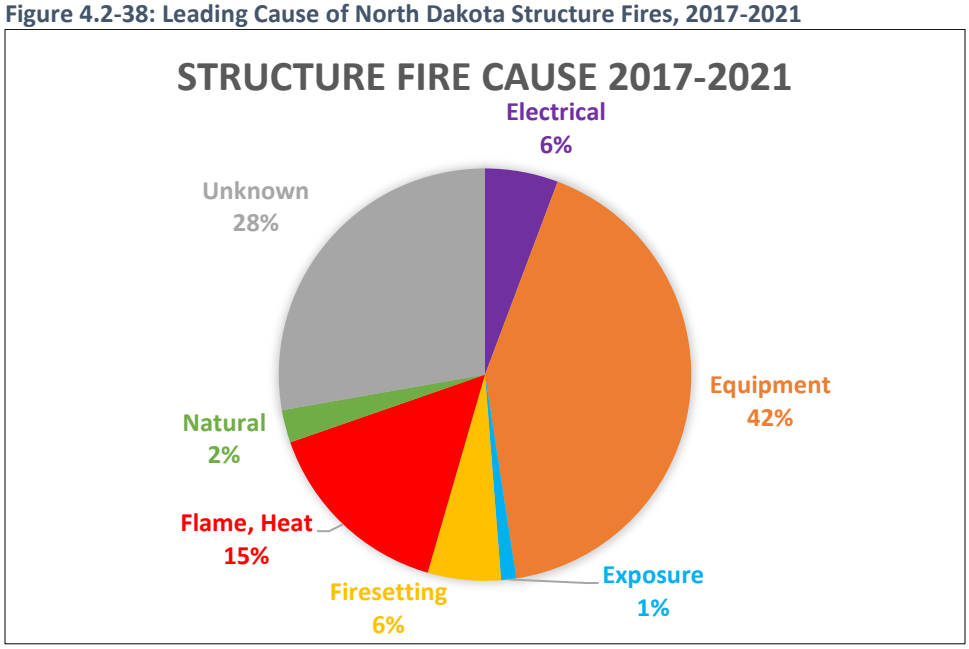
Figure 4.2-37: Spatial Extent for Urban Fire

Resource	Extent
Public	Local
First Responders	Local
Delivery of Service and Continuity of Operations	Local
Property, Facilities, and Infrastructure	Local
Environment	Local
State Economy	Local
Public Confidence in the State's Governance	Local

4.2.4.1.4 Probability

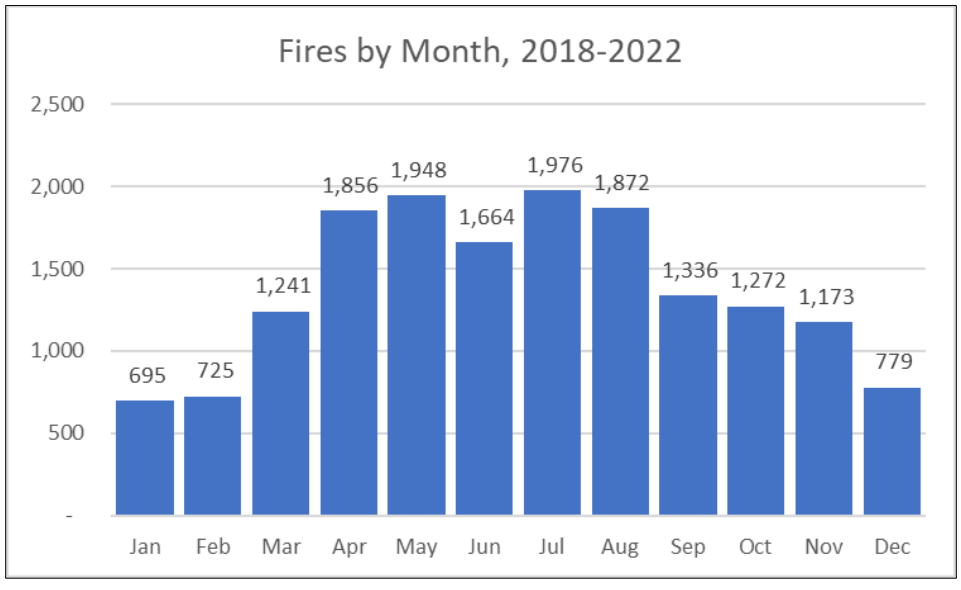
Structures fires will occur each year with high certainty; the greatest goal against structure fires is for residential structures to be equipped with working smoke alarms to reduce the number of fire related injuries and fatalities that occur across the state. NFIRS reports the most common cause of a structure fire is equipment related (2023). **Figure 4.2-38** displays the top seven causes, which include equipment, unknown, open flame, or heat, electrical, fire setting, natural, and exposure and **Figure 4.2-39** reports that the month with the highest frequency of fires is July.

Figure 4.2-38: Leading Cause of North Dakota Structure Fires, 2017-2021



Source: NFIRS, 2023

Figure 4.2-39: Fires by Month, 2018-2022



Source: NFIRS, 2023

4.2.4.1.5 Warning Time and Duration

The most effective tool available to increase the warning time of a structure fire is a smoke detector. Per NFIRS, smoke detectors increase warning time for occupants, and in 81.2 percent of the fires in which detector use was determined, the occupant was alerted by detectors. **Figure 4.2-40** compares fire incidents in which a smoke detector alerted and did not alert occupants from 2018 to 2022. The duration of structure fires is significantly less than wildfires, typically lasting no longer than a few hours.

Figure 4.2-40: Fire Statistic Comparison of Detectors Alerting or Not Alerting Occupants, 2018-2022

Detector Alerted Occupants									
Year	Fires	Percent	Civilian Deaths	Civilian Injuries	Firefighter Deaths	Firefighter Injuries	Property Loss	Contents Loss	Loss Per Fire
2018	367	81.2%	0	3	0	0	$ 3,077,080	$ 1,185,760	$ 11,615
2019	801	85.4%	0	1	0	0	$ 3,744,555	$ 413,610	$ 5,191
2020	631	85.6%	1	2	0	6	$ 10,928,699	$ 1,743,150	$ 20,082
2021	204	73.4%	0	6	0	0	$ 2,255,185	$ 695,325	$ 14,463
2022	227	74.7%	3	6	0	1	$ 3,486,728	$ 1,459,760	$ 21,791
Avg	**446**	**80.1%**	**0.8**	**3.6**	**0**	**1.4**	**$ 4,698,449**	**$ 1,099,521**	**$ 14,629**
Detector Did Not Alert Occupants									
Year	Fires	Percent	Civilian Deaths	Civilian Injuries	Firefighter Deaths	Firefighter Injuries	Property Loss	Contents Loss	Loss Per Fire
2018	85	18.8%	0	1	0	0	$ 859,300	$ 280,750	$ 13,412
2019	137	14.6%	0	1	0	0	$ 399,700	$ 167,985	$ 4,144
2020	106	14.4%	0	1	0	2	$ 668,970	$ 433,835	$ 10,404
2021	74	26.6%	0	2	0	0	$ 870,296	$ 336,950	$ 16,314
2022	77	25.3%	1	1	0	1	$ 1,648,455	$ 853,577	$ 32,494
Avg	**95.8**	**19.9%**	**0.2**	**1.2**	**0**	**0.6**	**$ 889,344**	**$ 414,619**	**$ 15,354**

Source: NFIRS, 2023

4.2.5 Consequence and Vulnerability Loss Analysis

This section describes the consequences and state and local vulnerabilities of urban fire. Both consequences and vulnerabilities are defined as follows in the context of this resource:

- **Consequence**: is the "degree of debilitating impact that would be caused by the incapacity or destruction of critical infrastructure or a critical function" (FEMA Emergency Management Institute, 2023, p. 1564). Consequences can be tangible impacts to buildings or systems or intangible impacts on processes, business, or reputation. Consequences include debilitating impacts, such as the loss of critical functions, data, or public confidence. It also includes cascading effects that may affect functionality of critical services such as the loss of service of a utility or communications.
- **Vulnerability**: "is susceptibility to physical injury, harm, damage, or economic loss. It considers the extent of injury and damages that may result from a hazard event of a given intensity in a

given area" (FEMA Emergency Management Institute, 2023, p. 104). This may be a geographic, social, or economic feature that makes harm from a hazard more likely or more intense.

4.2.5.1 Human Loss

Per the U.S. Fire Administration (USFA), residential structure fires in North Dakota cause 1.5 deaths and 21.4 injuries per 1,000 fires, while the national average is 6.5 deaths and 20.9 injuries per 1,000 fires. The U.S. Fire Administration reported five fire fatalities in calendar year 2019, eight in 2020, two in 2021, and 11 in 2022. This reports fatalities from all causes and in all residential building types. **Figure 4.2-41** combines structure fire frequencies, deaths, injuries, and dollar losses and reports an annualized loss for the state of slightly over $26 million dollars. A home fire that results in a fatality is devastating to any size community, and several emotionally challenging examples of loss have occurred across North Dakota recently.

- Shortly before the holiday season in November of 2022, a married couple died in a home fire in Lisbon, ND (population 2,190). The home was considered a total loss and they left behind a surviving teenage daughter.
- In June 2023, a father and his three-year-old daughter were rescued from an apartment fire in Fargo; however, the toddler died the same day and the father succumbed to fire related injuries days later.
- In April of 2023, a mobile home fire in Grand Forks resulted in a total loss. Fortunately, the homeowner escaped and was not hurt, but two pets perished in the fire. While not a human loss, this incident is a reminder that the loss of household pets to home structure fires adds devastation to the survivor's emotionally challenging recovery.

Figure 4.2-41: Structure Fire Losses, 2018-2022

Calculating Structure Fire Losses, 2018-2022		
Metric	**Total**	Annualized
ND Structure Fires	4,424	884.8
ND Structure Fire Deaths	27	5.4
ND Structure Fire Injuries	10	2.5
ND Structure Fire Dollar Loss	$ 130,866,840	$ 26,173,368

Source: NFIRS, 2023; US Fire Administration, 2012

4.2.5.2 First Responders

Please see section 4.2.2.2 First Responders; the information also pertains to urban fires.

Volunteer departments are typically located in small, rural, communities and these communities in North Dakota pride themselves on being tightknit and neighborly. The same volunteer firefighters, who are already facing staff shortage and retention challenges, are performing a demanding job amidst having other full-time employment. These firefighters are responding to structure fire calls to homes that can belong to friends or businesses that can be owned or operated by extended family members. This puts an immense emotional and psychological toll on volunteer firefighters and requires a strong

amount of discipline to not allow emotions to override response decisions that need to be made based on training, logic, and firm assessment of the scene.

4.2.5.3 Environmental, Natural, and Cultural Resources

Urban fires are the fires that occur anywhere in the collective built environment; anywhere that can be built can be designed to be protected from urban fires. Some of North Dakota's historic and culturally significant sites that need special safeguarding from urban fires include:

- The North Dakota Heritage Center and State Museum in Bismarck, one amongst many interesting and historically valuable museums across the state;
- The Metropolitan Opera House (or "The Met") located in downtown Grand Forks;
- Theodore Roosevelt Rough Rider Award Hall of Fame, located onsite of the state capital;
- Arrowwood National Wildlife Refuge, an educational and protective center for migratory birds; and
- Coghlan Castle, located north of Rolla.

4.2.5.4 Property, Facilities, and Infrastructure Damage

Vulnerability to a structure fire is directly related to property or facility types. Residential construction has improved as advancements in building codes and science, material quality, and technology have progressed. Therefore, older constructed homes, particularly those that have not been brought up to the latest electrical and building codes, can be considered more vulnerable to structure fires.

Mobile or manufactured homes have outsized exposure and increased vulnerabilities to not only fire, but also floods, tornadoes, and hurricanes (Pierce, Gabbe, and Rosser, 2022). It was not until 1974 that U.S. Congress passed the National Manufactured Housing Construction and Safety Standards Act (42 U.S.C. 5401 et seq.) to accomplish several needed actions: establish and enforce construction and safety standards for manufactured housing, create a single, preemptive code to ease burdens on manufacturers, and protect consumers (homeowners). While the National Manufactured Housing Construction and Safety Standards Act was a starting point, it would be overhauled with more specific safety and code regulations in 2000 by The Manufactured Housing Improvement Act (Holler, 2023). Not only was the original statue amended, but the inability to update safety standards on a timely basis was addressed and the Manufactured Housing Consensus Committee (MHCC) was formed, which is a federal advisory committee of 21 voting members representing three primary interest groups, that meet regularly and consider and recommend ongoing changes in construction and safety code as they pertain to manufactured and mobile housing.

Figure 4.2-42: Manufactured Home Fires

Mobile Home Fires 2018-2020	
Year	**Fires**
2018	43
2019	47
2020	44
Average	44.7

Source: NFIRS, 2023

Mobile or manufactured homes produced and sold prior to 2000 and especially prior to 1974 that are still being lived in as residences are at increased vulnerability to fire hazards because they were not required to have flame spread limitations and fire protections that only became enforced after 2000

(Holler, 2023). In other words, prior to 2000, mobile and manufactured homes were not required to protect nonhorizontal surfaces of cabinets above the bottom of the range hood with limited combustible material, there was not regulation on the finish material's flame spread rating, and there was not minimum thickness requirement for gypsum board (or equivalent) to separate finished material from the metal range of the kitchen hood.

Due to lack of regulations, the Federal Housing Administration (FHA) will not insure mortgages on manufactured or mobile homes nor will the FHA issue tags for manufactured or mobile homes built prior to June 15, 1975, which is when the National Manufactured Housing Construction and Safety Standards Act went into effect (UNITED STATES Dept. of Housing and Urban Development, 2023). Mobile or manufactured housing is an important source of affordable housing in the United States, and is less than half the cost of standard, site-built housing (Dawkins et al., 2011). Higher quality of construction material, innovations in manufactured housing building technology, and federal regulations are making manufactured units almost indistinguishable from traditional site-built homes. Those factors, along with strong local zoning and subdivision ordinances, can increase resiliency of this common housing type; however, older mobile homes, due to lack of regulation and nature of their construction and material quality, are still extremely vulnerable, or least resistant, to structure fires.

Citizens that rent as opposed to owning their own home, are protected under State fire regulations; however, regulation varies depending on the size, or number of housing units within the building. For example, a structure that has only two units (i.e., a duplex or a single townhome) is regulated per state fire code differently than a structure that has more than two units (i.e., a triplex or apartment building) (ND State Fire Marshal's Office, 2023). While the State of North Dakota does require landlords provide smoke alarms, currently there is no enforcement mechanism in place.

While building homes and facilities to the highest standards following the most current building codes utilizing fire resistant materials is considered foundationally the most effective way to protect property and facilities from urban fires, some additional actions can be taken to mitigate urban fire impacts. Other mitigation activities, such as installing fire suppression systems, are another viable option to protect property, facilities, and infrastructure from structure fires.

In February 2011, the LaMoure School had a fire. The fire was during a cold winter night and several departments were called to help fight the blaze. One classroom had to be completely redone and the entire high school had smoke damage that caused relocation of the students to the Bear Creek Lodge (former Verona School) for several weeks.

(LaMoure County Multi-Jurisdictional Hazard Mitigation Plan, 2020)

4.2.5.5 Critical Facilities, Community Lifelines, and State Assets

Urban fires are a concerning hazard if the fire occurs at a critical facility or location that stores state owned assets. An urban fire, if it occurred at a corresponding critical facility, could have the ability to impact the following Community Lifelines: Safety and Security, Health and Medical, and Hazardous Materials.

- Safety and Security: An urban fire that occurs at a law enforcement center, fire department, or government center could impact Safety and Security operations.

- Health and Medical: An urban fire that occurs at any medical facilities (clinics, hospitals, assisted living facilities) or urban fires that occur at a facility that manufactures or stores medical supplies or devices could impact Health and Medical operations.
- Hazardous Materials: An urban fire that occurs at a facility that contains, utilizes, or stores hazardous materials becomes an extremely dangerous situation. Fires that contain hazardous materials require specialized training and experience from first responders and can create environmental and health concerns for the impact area, depending on the type(s) of hazardous materials and their response to combustion.

Fire sprinkler systems have been around for almost 150 years, and they have been shown to reduce fire loss. Fire incident reports show that fire sprinklers have protected billions of dollars' worth of property and contents each year and the loss ratio in sprinkler-controlled fires is just over one percent of the value of the building and contents (NFSA, 2023). Per the state of North Dakota's Fire Code (2017), fire sprinkler systems are required in most commercial facilities and public businesses.

4.2.5.6 State Economy and Economic Disruption

Individuals and households that experience an urban structure fire will need personal recovery. The extent of the economic disruption felt at the individual and household level is impacted by adequate insurance coverage (both structural and content), personal preparedness levels, financial stability and savings, healthy psychological coping mechanisms, emotional and social support networks, and a sense of connectedness to their communities.

Individuals and households that lack personal resilience can result in adults missing more days from work, children missing more days from school, and compounding financial hardships. Extremely difficult cases can see families facing food and housing insecurity or relocating from the area altogether post fire if housing availability does not meet their needs.

Businesses that experience disruption from an urban fire may have insurance, but lost revenues plus extra expenses mean reduced profits. Insurance also does not consider the consumers that patronize the competition while a business is offline. According to a report from FEMA 40 percent of small and mid-sized businesses (SMBs) do not reopen following a disaster (2021). On top of that, another 25 percent that do reopen fail within one year. Another way of stating this statistic is that almost 2/3rds of businesses that sustain a major fire will no longer exist a year later.

4.2.5.7 Delivery of Service and Continuity of Operations

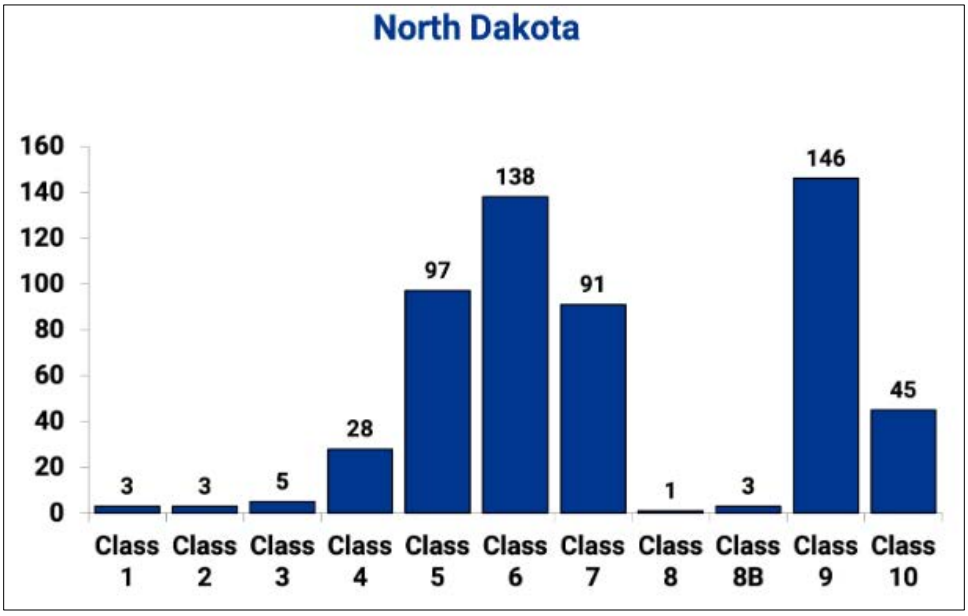
The Insurance Service Office (ISO) Public Protection Classification (PPC) program provides important, up-to-date information about municipal fire protection services. A PPC Class ranges from 1 to 10. Class 1 generally represents superior property fire protection, and Class 10 indicates that the area's fire suppression program does not meet the minimum criteria (ISO, 2023). Per the ISO (2023) a community's PPC depends on:

- Emergency communications systems, including facilities for the public to report fires, staffing, training, certification of telecommunicators, and facilities for dispatching fire departments.

- The fire department, including equipment, staffing, training, and geographic deployment of fire companies.
- The water supply system including the inspection and flow testing of hydrants and a careful evaluation of the amount of available water compared with the amount needed to suppress fires.
- Community efforts to reduce the risk of fire, including fire prevention codes and enforcement, public fire safety education, and fire investigation programs.

The state of North Dakota has three Class 1 Fire Departments: The City of Fargo, The City of Grand Forks, and The City of Bismarck. All three of these fire departments are staffed by paid, career firefighters. The ISO was contacted for their data on the relationship between ISO Class and staff type (career, volunteer, or combination) but declined, stating their research was restricted information not shared with the public.

Figure 4.2-43: North Dakota Fire Department ISO Class Ratings



Source: The Insurance Service Office (ISO) PPC, 2023

The PPC program recognizes the efforts of communities to provide fire protection services for citizens and property owners. A community's investment in fire mitigation is a proven and reliable predicator of future fire losses.

Fire Departments that are combination or purely volunteer staffed have additional service delivery and continuity of operations challenges beyond departments that are career, or paid, staff. Volunteer firefighters have other work commitments, and volunteer-based departments typically have longer response times when compared to career staff departments. Volunteer firefighters are more vulnerable to exhaustion and heat exposure related illnesses as there is not a designated new shift of staff members set to arrive on a schedule on large, prolonged responses.

Structure fires rarely disrupt the state of North Dakota's ability to maintain continuity of state operations. Structure fires have occurred at several state-owned facilities in recent years; despite the

on-site fires, departments maintained staffing levels, programs continued uninterrupted, services were delivered, and overall continuity remained intact.

4.2.5.8 Public Confidence in the State's Governance

Urban fires are emotionally challenging events to the state of North Dakota; however, fire departments across the state, despite challenges, are reliable and remain prepared to respond to their community's needs. The public maintains a prominent level of confidence in state leadership regarding urban fire responses, and the men and women that serve on fire departments are respected, admirable members of their communities.

4.2.5.9 Estimation of Annual Losses

Structure fires contribute to billions of dollars in annual loss nationwide. **Figure 4.2-44** summarizes NFIRS (2023) and U.S. Fire Administration (2012) data to report an annualized loss for the state of North Dakota, spanning 2018-2020, exceeding $27 million dollars when factoring fire calls, mutual aid requests, fire service caused injuries and fatalities, and civilian injuries and fatalities.

Figure 4.2-44: North Dakota Annualized Urban Fire Losses, 2018-2020

NFIRS Damage Overview, 2018-2020					
Category	**2018**	**2019**	**2020**	**Total**	***Annualized***
Fire Calls	2,488	2,347	3,235	8,070	*2,690*
Mutual Aid	392	325	496	1,213	*404*
Fire Service Injuries	8	10	52	70	*23*
Fire Service Deaths	0	0	0	-	-
Civilian Injuries	12	7	14	33	*11*
Civilian Deaths	4	1	9	14	*5*
Loss	$18,333,755	$31,827,342	$33,195,206	$83,356,303	*$27,785,434*

Source: NFIRS, 2023; U.S. Fire Administration, 2012

Residential fires can lead to financially and emotionally difficult recoveries. Data related to compiled homeowners' insurance rates from homes before and after a fire that resulted in total property loss, found that fire damage led to higher insurance rates nationally. Nearly two decades' worth of U.S. Fire Administration data shows that residential fires have caused billions of dollars in damage to homes across the country. The most recent data from the U.S. Fire Administration (2003 to 2019) showed residential fires have caused an average of $8.1 billion in damage annually, or $138 billion total (ValuePenguin, 2021). The ability for an individual to recover financially post fire directly impacts their ability to also recovery socially, emotionally, and psychologically.

Insurance providers cover part of the fire damage costs on behalf of their policyholders, but these expenses result in higher prices. Calculated average cost of home insurance shows an increase of 27 percent after a residential fire (ValuePenguin 2021). Depending on the state, average rates could rise by as much as 42 percent or as little as 6 percent (ValuePenguin 2021). North Dakota is in 30th place with the average annual cost after fire being $2,279 which is an average increase of 27 percent (ValuePenguin 2021). This makes North Dakota's insurance increase post-fire claim in alignment with the national average.

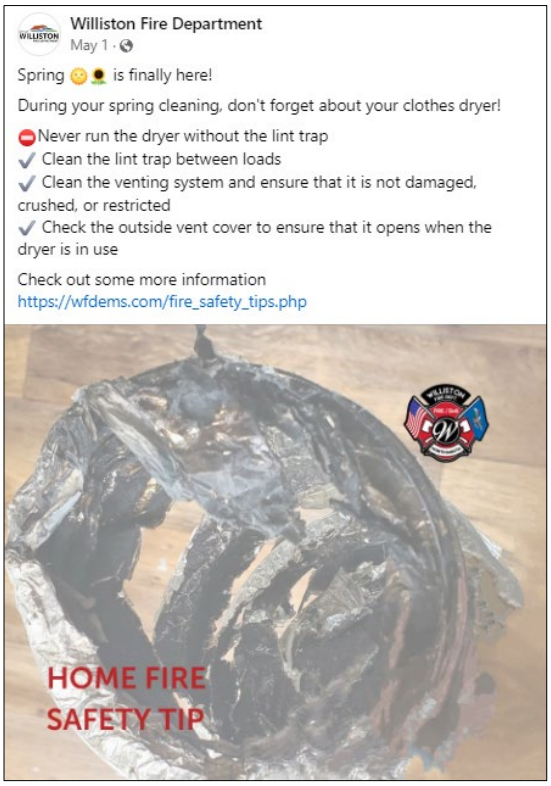
Figure 4.2-45: Aggregated Property and Content Fire Losses, 2018-2022

NFIRS Aggregated Fire Losses, 2018-2022						
Category	**2018**	**2019**	**2020**	**2021**	**2022**	**Total**
Property Loss	$ 14,244,916	$ 20,930,517	$ 27,059,655	$ 21,464,081	$36,129,200	$ 119,828,369
Contents Loss	$ 4,088,839	$ 10,896,825	$ 6,135,551	$ 22,899,631	$11,171,508	$ 55,192,354
Total Loss	$ 18,333,755	$ 31,827,342	$ 33,195,206	$ 44,363,712	$47,300,708	$ 175,020,723
The average property loss is $23,965,674.00 and the average contents loss is $11,038,471.00 for a collective average total loss of $35,041,145.00.						

Source: NFIRS, 2023

Figure 4.2-45 reports the national average property loss is $23,965,674.00 and the average contents loss is $11,038,471.00 for a collective average total loss of $35,041,145.00. The impact of fire on the economy goes well beyond direct property and content losses and damages; however, there are also the psychosocial costs of emotional distress from the loss of personal possessions and family treasures, living with permanent scarring to burn survivors, increased pressure on nonprofits and social service providers and potentially reduced curb appeal to a neighborhood.

Figure 4.2-46: Fire Safety Messaging from the Williston Fire Department



Source: Williston Fire Department Social Media

4.2.5.10 Community Resilience

NDDES along with numerous fire departments across the state promote a culture of urban fire safety year-round. One common way these organizations connect with communities to promote fire safety awareness and spread fire safety tips is through social media. Fire departments across the state have also engaged in traditional and non-traditional ways to build community resilience and create a culture of fire safety. National Fire Prevention Week is observed in the U.S. each year during the week of October 9. During this week, fire departments visit schools and public spaces, such as libraries, often in full response gear and with different fire trucks to speak about how to practice fire safety. Fire departments host open houses and give tours at stations and involve citizens in activities such as the Smoke House demonstration to teach kids how to safely exit a structure when smoke is present and coloring contests to develop home fire escape route plans and identifying the designated safety meeting spot are just some of many examples.

Fire departments also have programs where firefighters and/or nonprofit volunteers will visit homes and test and install, if needed, smoke alarms while teaching families about fire safety within their own homes. Fire departments have come up with creative ways to communicate with individuals and families on-site at homes, like when firefighters accompanied a pizza provider on their deliveries to surprise families by delivering their order and taking a quick moment to speak about fire safety. **Figures 4.2-46** through **Figure 4.2-49** showcase a collection of social media posts from fire departments across the state promoting fire safety awareness.

Figure 4.2-47: Fire Safety Messaging from the Fargo Fire Department

Figure 4.2-48: Building Resilience in the Next Generation: Devils Lake Fire Department Teaching Youth About Home Fire Safety

Source: Devils Lake Fire Department Social Media Account

Figure 4.2-48: Fire Safety Week, 2021

Source: Jamestown Fire Department Social Media Account

January 2022. The gas station in the city of Carson was destroyed by fire. Approximately 350 tires were involved in the fire.

(Grant County Multi-Jurisdictional Hazard Mitigation Plan, 2022)

Despite creative and innovative fire safety messages, urban fires do still occur. Those that do occur in residential dwellings particularly impact the public. Stories of individuals or families that have experienced a home fire are reported in the news, regardless of the population size of a community. It is not uncommon to see local efforts organize fundraisers and donation drives on behalf of those that experience a home fire to offset recovery expenses, to financially support the replacement of necessary items, and to overall help folks "get back onto their feet." The comradery of community tends to band together ensuring an individual or family will have as near normal as holiday as possible.

4.2.6 Risk Analysis

Risk can be defined as the potential for loss of or damage to an asset (FEMA, Emergency Management Institute, 2023). This section analyzes the potential loss or damage due to urban fires in North Dakota.

4.2.6.1 National Risk Index

Urban fire is not one of the 18 natural hazards included in the National Risk Index.

4.2.6.2 Risk Index Score

Please refer to section 4.2.2.13. Risk Index Score: the same information applies to urban fires.

4.2.6.3 Jurisdictions at Risk

A fire hazard is defined at the local level including both wildfire and urban fire, please refer to section 4.2.2.14 Jurisdictions at Risk with the same information applying to urban fires.

4.2.7 Summary/Conclusion

Fire as a hazard can be separated and analyzed into two categories, wildfire and urban fires, and both types of fire hazards occur frequently in North Dakota. Wildfires occur in the open wildland. Within the state, wildfires are responded to by the North Dakota Forest Service or local fire department personnel, depending on location of the fire and jurisdiction. Wildfires cause fewer human fatalities but threaten the state's agricultural, livestock, and oil and gas economic sectors.

Wildfires can be mitigated with community scale actions, such as the creation and maintenance of defensible space.

Urban fires occur in the built environment. These fires claim lives more frequently and create devastating and challenging recoveries for individuals and families. Urban fires can be mitigated by practicing and creating a culture of fire safety and building and retrofitting buildings with fire-resistant materials.

North Dakota can expect more frequent, larger, and more intense wildfires, which is not only concerning from a future condition perspective, but North Dakota also has recognized a challenging trend with recruiting and retaining volunteer firefighters, which most of the state's fire departments utilize.

4.2.8 Data Limitations

All data in the wildfire hazard profile was supplied from a variety of state, local and federal sources. Many data collection points are sourced from local fire departments optionally self-reporting; this can create lags in the timeliness and the completeness of data being reported. This can be particularly challenging for small, rural, volunteer-based departments where administrative tasks are not always the highest priority. This can also result in discrepancies in numbers on data reports from local sources versus national sources.

Information from the private sector and information from individual fire departments was not included for this state-level plan and may have provided additional, supplemental insight had it been included. For example, outreach was made to the Insurance Service Office (ISO) requesting specific information on topics they have researched; however, the request was denied due to their data being considered proprietary information that they do not share publicly.

The North Dakota Fire Needs Assessment Survey currently being developed in 2023 will provide valuable insight to the current conditions and future needs of both volunteer firefighters and volunteer fire departments. Due to the timeline of this survey, getting the results to include in this update of the North Dakota's Enhanced Mitigation Mission Area Operations Plan was not possible.

4.3 Drought

4.3.1 Overview

4.3.1.1 Description

The American Meteorological Society defines drought as "a period of dry weather sufficiently long enough to cause a serious hydrological imbalance" (AMS, 2019). NOAA's National Weather Service, in coordination with the AMS and the World Meteorological Organization (WMO), further defines drought as a "deficiency of moisture that results in adverse impacts on people, animals, or vegetation over a sizeable area" (NWS: Drought, 2023). Regardless of the definition used, drought is a severe decrease in precipitation to the point that there are negative impacts on the environment. The National Integrated Drought Information System (NIDIS) helps coordinate across agencies and governmental levels and provide drought information for the nation.

To better classify drought conditions, NIDIS (2023) identifies these seven types of droughts:

- Meteorological: related to abnormally dry weather patterns in an area.
- Hydrological: low water supply
- Agricultural: crops and livestock are impacted by dry conditions.
- Socioeconomic: supply and demand of commodities are impacted by dry conditions.
- Ecological: natural ecosystems are impacted by dry conditions.
- Flash drought: rapid onset or intensification of drought conditions.
- Snow drought: low snowpack accumulation for a season due either to abnormally dry snow or a lack of snowfall.

"North Dakota's use of Conditional Monitoring Observer Reports (CMOR) for recommendations to the U.S. Drought Monitor authors"

Since the CMOR system was established in 2018, North Dakota has been uniquely successful in getting on-the-ground reports about drought-related conditions that are evenly distributed across the state and across the growing season. This is largely because of its dedicated team, which includes Adnan Akyuz, North Dakota State Climatologist, and Miranda Meehan, NDSU Extension livestock environmental stewardship specialist and disaster education coordinator.

During the growing season, the team consistently submitted weekly observations, even if they were to report "status quo". "We wanted to tap mainly into local experts who are well acquainted with local farmers and ranchers, and drought impacts in their operations, and be able to relay that information objectively in CMOR," Akyuz said.

In 2021, NDSU Extension contributed 864 reports out of 2,078 submitted nationwide, and in 2022, when drought was less of an issue in the state, they contributed 372.

Even with a network of well-trained, unbiased observers, North Dakota conducts independent evaluation of reports. Akyuz credited Allen Schlag, a hydrologist at the National Weather Service in Bismarck, and Brad Hopkins, National Weather Service Office in Grand Forks, with providing expert opinion across the state.

Source: Smith, 2023

The concepts of flash drought and snow drought have been most recently identified but are now widely recognized terms, used by scientists, and practitioners across government agencies and the private sector (NIDIS, 2023). A flash drought can be any of the above types but is identifiable by its rapid onset or intensification of dry conditions. Whether flash or regular onset, droughts can be identified using a range of scales, which are described in **Figure 4.3-1**.

Figure 4.3-1: Common Drought Indices in Use in the United States

Drought Index	Description
Keetch Byram Drought Index (KBDI)	Used for wildfire risk potential, based on daily water balance including soil moisture
Percent of Normal Precipitation	Simple calculation to describe precipitation anomalies
Standardized Precipitation Index (SPI)	Used by the National Drought Mitigation Center and the Western Regional Climate Center; more complex calculation of a deviation from normal
Weighted Anomaly Standardized Precipitation (WASP)	A NOAA measure best applied to tropical areas
Crop Moisture Index (CMI)	A NOAA measure that measures week-to-week impact on seasonal crop and field activities
Drought Reconnaissance Index (DRI)	A measure common in United Nations data based on monthly comparisons
Palmer Drought Severity Index (PDSI)	Used by NOAA to measure long-term drought conditions in the past.
United States Drought Monitor (USDM)	The most widely referenced NOAA index, measures the persistence as well as severity of drought
Quick Drought Response Index (QDRI)	A NOAA measurement of short-term dryness over a 2-week period to identify the onset or expiration of drought
Soil Moisture Anomaly (SMA)	A NOAA measurement that evaluates total soil moisture conditions
Normalized Difference Vegetation Index (NDVI)/Temperature Condition Index (TCI)/ Vegetation Condition Index (VCI)	NOAA Satellite imagery used to evaluate the impact of wetness/dryness on vegetation

The U.S. Drought Monitor (USDM) is a cooperative effort of the National Drought Mitigation Center at the University of Nebraska-Lincoln, NOAA's Climate Prediction Center, and the U.S. Department of Agriculture. Meteorologists and climatologists from these organizations, in concert with State Climatologists from across the county, track conditions that may lead to drought formation or intensification. It's a comprehensive effort that includes direct measurements of soil moisture, temperature, and precipitation, along with measures of local drought impacts as determined by a mix of in-situ and remote sensors coupled with feedback and interpretation from local experts (USDM, 2023). Most of these other indices are analyzed as part of the weekly USDM analysis and forecast process.

The oldest of the current suite of operational drought indices is the Palmer Drought Severity Index (PDSI), developed in 1965 by Wayne Palmer, of the U.S. Weather Bureau (Palmer, 1965). The value of the PDSI is that it is calculable using readily available measures of temperature, precipitation, and available water content, with comparative data available for most locales back to 1895 (Fuchs, 2012).

Drawbacks in using the PDSI are that the index uses bulk information not easily scalable to weekly analyses or sub-county areas. In addition, the PDSI was not designed to handle winter season conditions that affect the northern and/or intermountain states including snowfall, snow cover, and frozen ground conditions.

Perhaps the simplest index to use is the Percent of Normal Precipitation. For most areas, this gives one of the earliest indications of potential crop stress or water supply issues.

The Standardized Precipitation Index (SPI) uses a more complicated algorithm but still relies solely on local measurements of precipitation (McKee et al., 1993), and is likely the most widely used index, worldwide (Hayashi & van der Kamp, 2021). According to Bazrkar et al. (2021), variants of the SPI, such as the Standardized Precipitation and Evapotranspiration Index (SPEI), are especially useful for the tracking of drought conditions in intermountain and Northern Plains locations during the winter season.

The Keetch-Byram Drought Index (KBDI) was originally formulated in 1968, primarily for forestry and wildfire applications, and remains in widespread use. It's one of several specialized drought indices, including the PDSI, which provide the backbone of the U.S. Forest Service's Wildland Fire Assessment System (WFAS, 2023). For precipitation, tracked in concert with temperature, has provided generations of farmers with a simple indexing scheme, trackable at the farm field level.

4.3.1.2 Previous Occurrences

Drought has been experienced in North Dakota in almost every decade since 1930. North Dakota has recorded drought in the 1930s, 1950s, early 1960s, mid 1970s, early and late 1980s, multiple years throughout the early 2000s, in 2012, 2017, and is currently experiencing a statewide drought that began in 2021.

Figure 4.3-2 describes drought impacts by various types and the frequencies where the incidents occurred statewide. This data is generated by the Drought Impact Report (DIR) at the National Drought Mitigation Center (DIR, 2023). The impacts in the DIR are gathered from a wide variety of news media reports. Analysts assess impact

Figure 4.3-2: Drought Impact by Type and County Leaders 2018-2022

Agricultural Impacts	
County	**Incidents**
Morton County	22
Ward County	20
McHenry County	18
Williams County	18
Burke County	17
Fire	
Morton County	10
McKenzie County	9
Billings County	9
Mountrail County	7
Ward County	7
Burke County	7
Renville County	7
Bottineau County	7
Golden Valley County	7
Stutsman County	7
Relief, Response, and Restrictions	
Morton County	13
McKenzie County	12
Billings County	10
Mountrail County	10
Ward County	10
Burke County	10
Renville County	10
Bottineau County	10
Plant and Wildlife	
Morton County	15
Ward County	13
McHenry County	11
Burke County	10
Dunn County	10
Pierce County	10
Water Supply and Quality	
Ward County	8
McLean County	6
Williams County	6
Mercer County	5
Mountrail County	5

Source: USDA Risk Management Agency, 2023

types by evaluating news articles each day and documenting an impact when they find evidence of a loss or change due to drought and categorize the type according to the categories shown in the figure.

Significant historical drought events include:

- **1930s Dust Bowl:** The Dust Bowl is a defining period for all of America's history, and the widespread challenges of a depressed economy, low market prices, manual and inefficient farming techniques, and grasshopper infestations all impacted North Dakota. The dire conditions of the Dust Bowl era forced many changes including establishing the Federal Crop Insurance Program. Banking institutions liberalized credit and organizations like the USDA, the North Dakota State Agricultural Experiment Station System, and Colleges and Universities with agricultural related programs all intensified research efforts to find better technology to control soil erosion, soil moisture conservation, creating grain varieties that could produce higher yields while withstanding drier conditions, improving fertilizers, and improving farming technology and techniques.
- **1988:** In 1988, Governor Sinner declared a statewide emergency due to the drought conditions. The state was experiencing agricultural losses, but the other pressing concern during this incident was both public water systems and individual water wells were running dry. The damage was estimated to be $3.5 billion, which does not include the secondary, or indirect, damage costs. Just as the Dust Bowl forced the creation of assistance programs, the severity of the 1988 drought also triggered the creation of additional aid programs from both state and federal agencies to include: provisions for livestock feed assistance, crop loss financial aid packages (deficiency and disaster payments), commodity stock adjustments, disaster credit and forbearance programs for agriculture producers and related small businesses, and some water-related assistance programs.

  The City of Grand Forks is the only jurisdiction in Grand Forks County that has a Drought Management and Demand Reduction Plan. It is the largest city in the county with a 2018 estimated population of 56,948. It draws its water from the Red River. The Red River has its source in the Great Plains which is subject to drought. If a drought with the severity of the 1930s drought occurred the Red River would not be able to supply Grand Forks with the water it needs.

  (Grand Forks County Multi-Jurisdictional Hazard Mitigation Plan, 2020)
- **2000-2007:** North Dakota was in some degree of drought for 78 consecutive months, from December of 2000 until June of 2007, with severity peaking in July 2006 when the entire state was at moderate drought status on the drought monitor scale. The drought concluded in calendar year 2007 with the livestock industry sustaining $32 million in damages from reduced grazing capacity and deaths.
- **2017:** The U.S. Drought Monitor declared North Dakota as the epicenter of drought for the nation with approximately six percent of the state at exceptional drought status on the drought monitor scale. The combination of prolonged hot temperatures and minimal precipitation contributed to the flash drought across the state's northern plains in this incident.

- **October 2018:** Drought conditions triggered the Drought Disaster Livestock Water Supply Assistance Program Funding. The program provides 50 percent cost-share assistance of up to $3,500 per project, with a maximum of three projects per applicant, to eligible livestock producers in designated counties experiencing drought-related impacts to their livestock operations.
- **Spring 2018:** The spring of 2018 found unexpected deaths of normally healthy calves. An investigation found that the hay being fed to the cows from the 2017 harvest was of poor quality and missing vital nutrients and minerals to maintain calves. Copper was one of the most deficient that contributed to the loss of the calves.
- **July 2019:** Drought conditions triggered the activation of the North Dakota Hay Hotline assistance program. The program assists ranchers who need hay, or those with hay to sell and/or pasture or hay land to rent to be paired up to mutually benefit in times of drought crisis.
- **Summer 2021:** Multiple counties across the state declared drought emergencies through county commission meetings. In addition, counties also enacted and enforced burn bans. The widespread drought conditions coincided with what became a record-setting year for the state of North Dakota in both the number of wildfires and the number of acres burned.

North Dakota has also been included alongside other states in droughts that collectively have eclipsed a threshold of a billion dollars in damages. These historic events are described in **Figure 4.3-3**.

Figure 4.3-3: Billion Dollar Droughts that Include North Dakota

Drought	Dates	Deaths	CPI-Adjusted Cost (Millions)	Other Areas Impacted
Central/Eastern Drought/Heat Wave	June 1980-November 1980	1260	$ 38,877.6	Central and Eastern States
U.S. Drought/Heat Wave	June 1988-August 1988	454	$ 52,210.4	Much of U.S.
Northern Plains Drought	June 1989-November 1989	0	$ 7,477.9	CO, IA, IL, KS, MO, NE, NV, SD, TX, UT
U.S. Drought	March 2002-November 2002	0	$ 15,310.8	30 States in West, Great Plains and East
Western/Central Drought/Heat Wave	March 2003-November 2003	35	$ 8,329.2	AZ, CO, IA, ID, IL, KS, MI, MN, MO, MT, NE, NM, OR, SD, WA, WI
Midwest/Plains/Southeast Drought	March 2006-August 2006	0	$ 9,116.6	AL, AR, CO, FL, GA, IA, KS, LA, MN, MO, MS, MT, NE, NM, OK, SD, TX, WY
U.S. Drought	January 2008-December 2008	0	$ 10,024.0	Al, AR, CA, CO, GA, ID, IN, KS, KY, MD, MN, MS, MT, NC, NJ, NM, OH, OK, OR, SC, TN, TX, UT, VA, WA, WI

Drought	Dates	Deaths	CPI-Adjusted Cost (Millions)	Other Areas Impacted
U.S. Drought/Heat Wave	January 2012-December 2012	123	$ 39,904.7	AR, AZ, CA, CO, GA, IA, ID, IL, IN, KS, MN, MO, NE, NV, MT, NM, OK, SD, TX, UT, WY
Western/Plains Drought/Heat Wave	March 2013-November 2013	53	$ 13,658.0	AZ, CA, CO, IA, ID, IL, KS, MI, MN, MO, NE, NM, NV, OK, OR, SD, TX, UT, WA, WI, WY
North Dakota, South Dakota, and Montana Drought	March 2017-December 2017	0	$ 3,100.0	MT, SD
Western/Central Drought and Heat Wave	June 2020-December 2020	45	$ 5,214.2	Western and Central States
Western Drought and Heat Wave	January 2021-December 2021	229	$ 9,696.1	Western and Central States

Source: NCEI, 2023

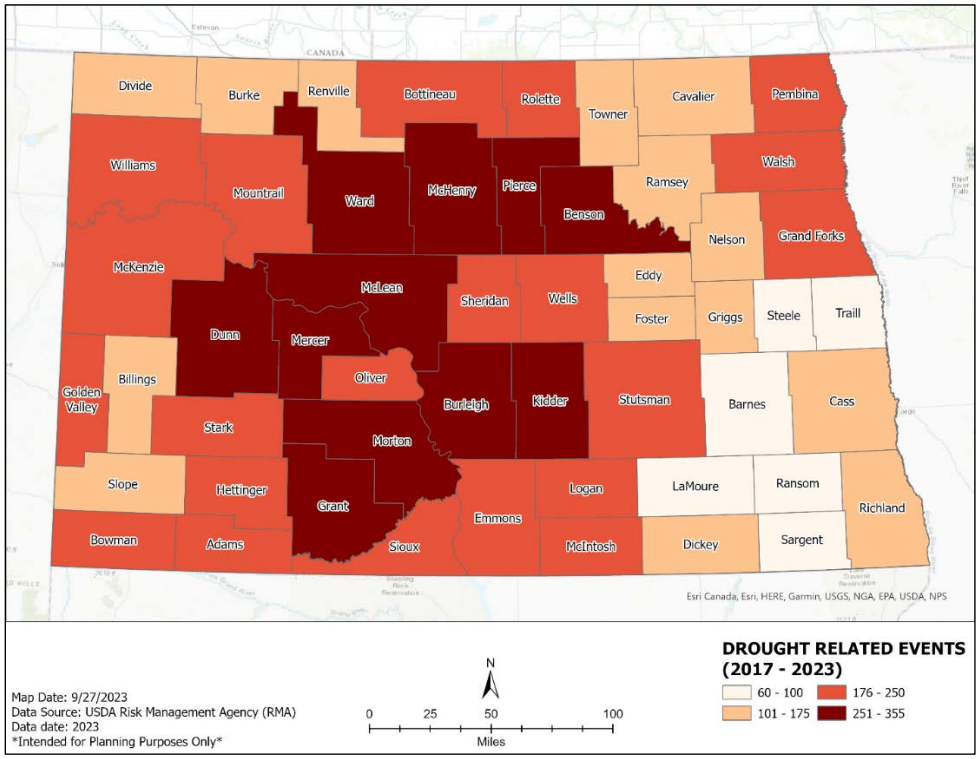
4.3.1.3 Location and Extent

Drought conditions can be localized, regional, or super-regional, and drought is one hazard that has occurred statewide. While the hazard can occur anywhere, droughts historically have occurred more frequently in the western and northwestern areas of the state. **Figure 4.3-4** shows the past six years, plus all recorded events to date in 2023, with most counties in North Dakota recording drought events numbering into the hundreds. The year 2021 was a particularly challenging year, and the frequency of events since 2000 is displayed in **Figure 4.3-5**.

Lake Sakakawea is a main source for potable water and low lake levels in the recent past have forced area water systems to extend intake pipes further into the lake. Recent population growth has resulted in an increased demand for potable water. Maintaining an adequate water supply may become difficult if this growth continues, particularly during times of drought. Water from the lake is also used in the area's oilfield hydraulic fracturing, an increasingly important element of the Reservation's economy.

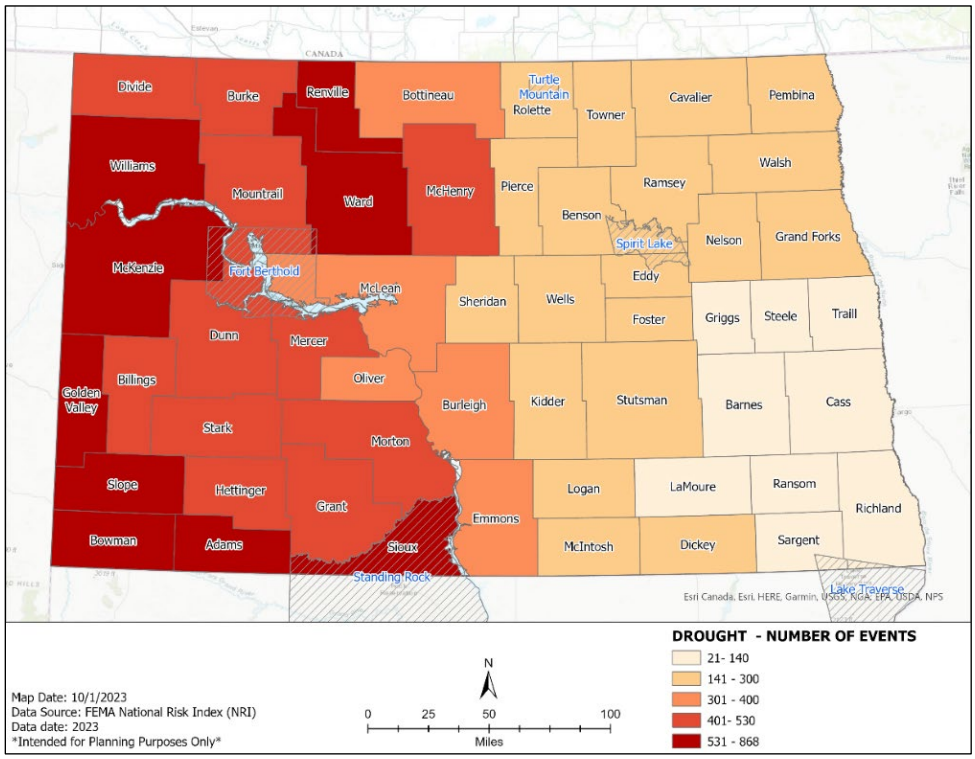
(Three Affiliated Tribes Tribal Hazard Mitigation Plan, 2018)

Figure 4.3-4: Statewide Drought Events, 2017 - 2023



Source: USDA RMA, 2023

Figure 4.3-5: Statewide Drought Events, 2000-2022



Source: NRI, 2023

Figure 4.3-6: Spatial Extent for Drought

Resource	Extent
Public	Statewide
First Responders	Statewide
Delivery of Service and Continuity of Operations	Statewide
Property, Facilities, and Infrastructure	Not Applicable
Environment	Statewide
State Economy	Statewide
Public Confidence in the State's Governance	Statewide

4.3.1.4 Probability

Given the lengthy history of frequent, severe, and prolonged drought incidents in the state history, North Dakotans have a high probability of experiencing drought hazards in varying degrees. Drought is a hazard that should be routinely prepared for and proactively planned for. **Figure 4.3-8** from the USDA's Drought Impact Reporter (DIR, 2023), reports changes in trends since the last plan publication, with increases reported for a percentage of time the state will experience drought. Future conditions and climate change impacts are discussed in greater detail later in this hazard profile in section 4.3.2.11.

Figure 4.3-7: North Dakota Drought Numbers, 2018-2022

North Dakota Drought by the Numbers, 2018-2022											
No Drought		D0 (Abnormally Dry)		D1 (Moderate Drought)		D2 (Severe Drought)		D3 (Extreme Drought)		D4 (Exceptional Drought)	
% of Time	Average % of State Impacted	% of Time	Average % of State Impacted	% of Time	Average % of State Impacted	% of Time	Average % of State Impacted	% of Time	Average % of State Impacted	% of Time	Average % of State Impacted
15.3%	42.5	84.8%	57.5	75.9%	39.1	59.1%	21.2	27.2%	8.4	8.4%	0.9

Source: DIR, 2023

Figure 4.3-8: North Dakota Drought Change in Trends Since Last Plan Publication

North Dakota Drought Change in Trends since 2018 Plan											
No Drought		D0 (Abnormally Dry)		D1 (Moderate Drought)		D2 (Severe Drought)		D3 (Extreme Drought)		D4 (Exceptional Drought)	
% of Time	Average % of State Impacted	% of Time	Average % of State Impacted	% of Time	Average % of State Impacted	% of Time	Average % of State Impacted	% of Time	Average % of State Impacted	% of Time	Average % of State Impacted
-10.2%	-0.2	-3.1%	0.2	18.5%	0.7	35.5%	1.1	57.0%	2.0	154.7%	2.9

Source: DIR, 2023

4.3.1.5 Warning Time and Duration

Drought can develop after a slow, lengthy deficiency of precipitation deviates from the norms. In these instances, drought provides ample warning times and allows ongoing tracking of conditions. However, drought can also have a quick onset, as is defined by a flash drought. Regardless of the speed of onset, the longer the duration of drought conditions the more severe both the direct and cascading impacts.

Figure 4.3-9: USDM Drought Across the Seasons, 2021

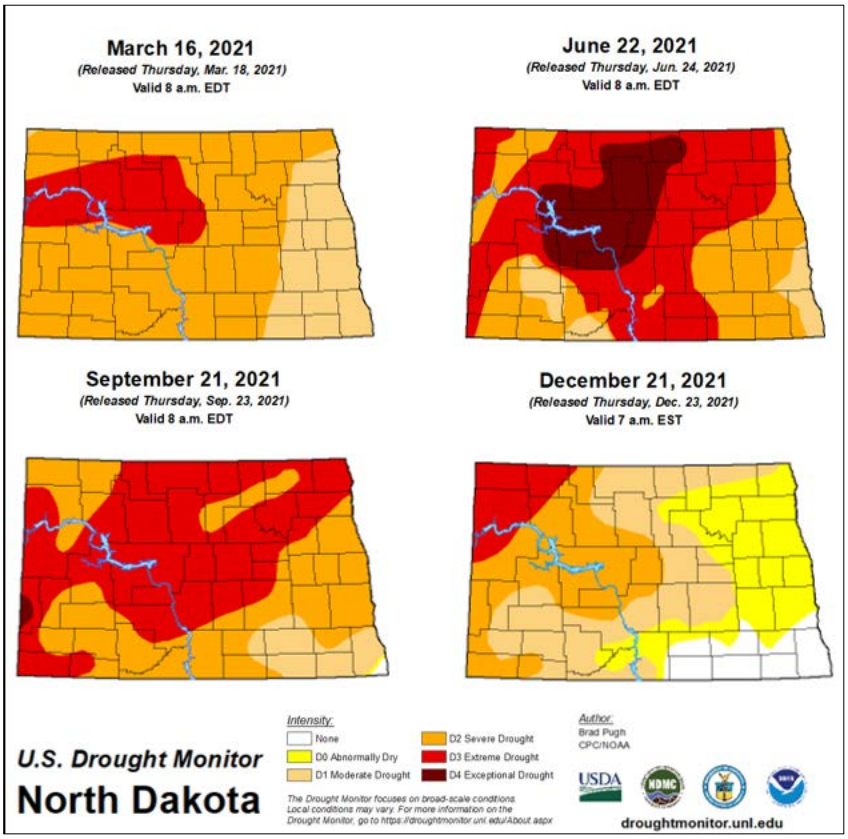


Figure 4.3-9 shows the severity of drought fluctuating over calendar year 2021, with the peak severity occurring in summer when all North Dakota counties were in D1 (moderate drought), and all counties had portions that were in D2 (severe drought) or higher. In late May through June 2021, ND reached its largest and longest D4 (exceptional drought) designation, since the Drought Monitor began in 2000.

4.3.2 Consequence and Vulnerability Loss Analysis

A consequence, according to FEMA's Emergency Management Institute (2023), is the "degree of debilitating impact that would be caused by the incapacity or destruction of critical infrastructure or a critical function." Consequences can be tangible impacts on buildings or systems or intangible impacts on processes, business, or reputation. Consequences include debilitating impacts, such as the loss of critical functions, data, or public confidence. It also includes cascading effects that may influence the functionality of critical services such as the loss of service of a utility or communications.

Vulnerability, according to FEMA's Emergency Management Institute (2023), "is susceptibility to physical injury, harm, damage, or economic loss." It considers the extent of injury and damage that may result from a hazard event of a given intensity in a given area. This may be a geographic, social, or economic feature that makes harm from a hazard more likely or more intense.

4.3.2.1 Human Loss

Drought intensifies conditions that result in human injuries and fatalities. Drought promotes dry conditions and heat that are serious concerns for vulnerable populations, such as the elderly, populations living without air conditioning (especially in dense housing developments), and populations that routinely work outside. Prolonged heat exposure can result in heat exhaustion, heat cramps, heat stroke, or in extreme cases, death.

Drought can negatively impact mental health. Much of North Dakota's workforce relies on agricultural or livestock commodities for its livelihood, both of which suffer economically during drought periods. The financial stress and instability experienced by farmers and ranchers can lead to increased mental health issues and suicides in times of severe and prolonged droughts.

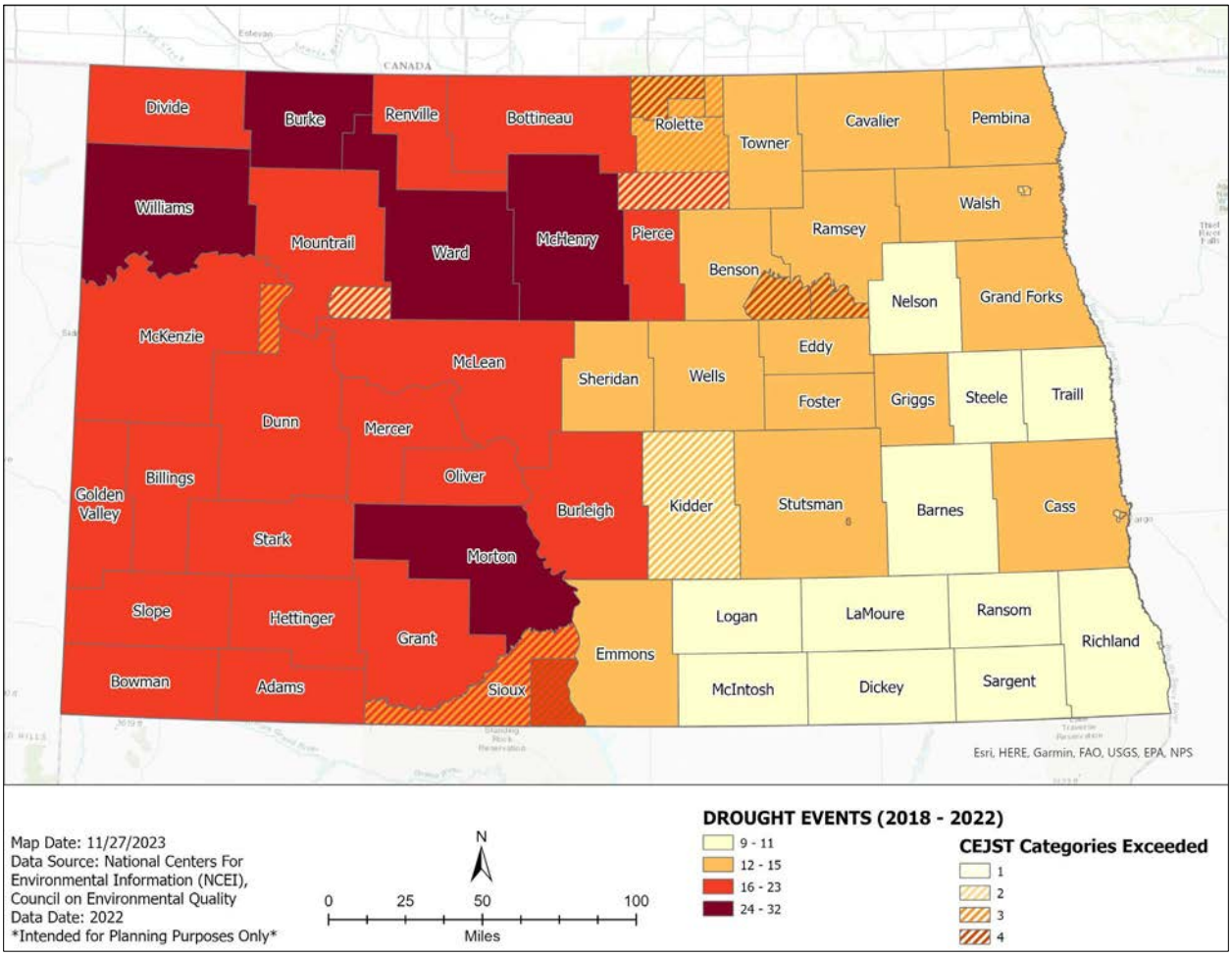
Several state agencies provide resources and support in mental health services. Among them are North Dakota Health and Human Services and the North Dakota State University Extension. The Farm and Ranch Stress Assistance Network (FRSAN) is a Multi-Agency Support Partnership led by the North Dakota Department of Agriculture that offers business operational resource support and free health care that includes mental health services and holistic wellbeing programs. The North Dakota Stockmen's Foundation, a registered 501(c)3 charitable organization established in 2008, also offers support through their Hope from the Heartland Drought Disaster Relief Program, which is another relief resource option for ranch families in the state to seek assistance from in times of drought.

Figure 4.3-10: Dried up watering hole near Dahlen.

Source: Eric Hylden, Grand Forks Herald, 2021

Figure 4.3-11 looks at the CEJST category exceedance areas and drought events by county. Several census tracts in Benson, Rolette, and Sioux counties that exceed 4 CEJST categories have also experienced moderate to high rates of drought between 2018 and 2022. These communities should prioritize drought relief measures aimed at vulnerable populations.

Figure 4.3-11: CEJST Exceedance Areas and Drought Events

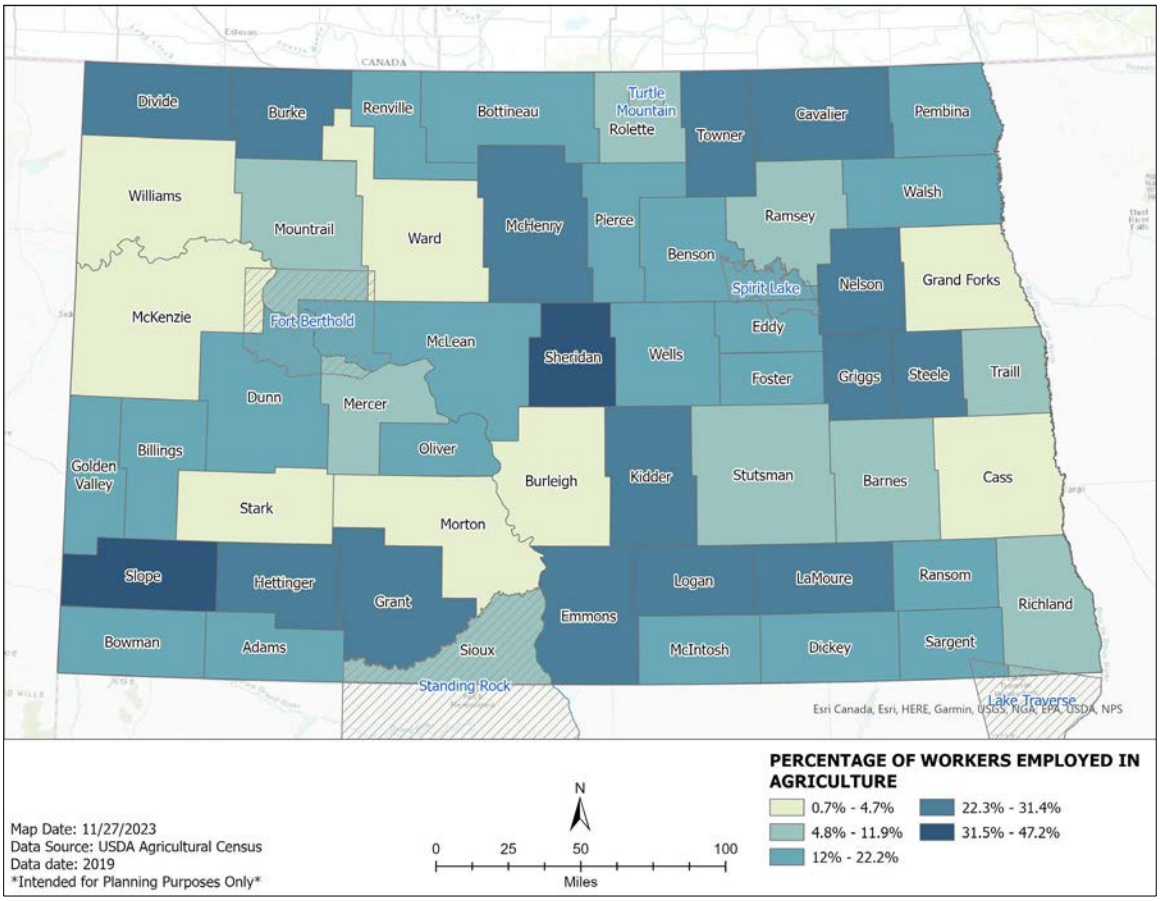


Source: NCEI, CEJST, 2023

For individuals, municipalities, or counties highly dependent on agriculture, the consequences of drought can extend beyond just agricultural loss. **Figure 4.3-12 and Figure 4.3-13**: both look at data related to vulnerability in the agricultural sectors in the larger-scales economy.

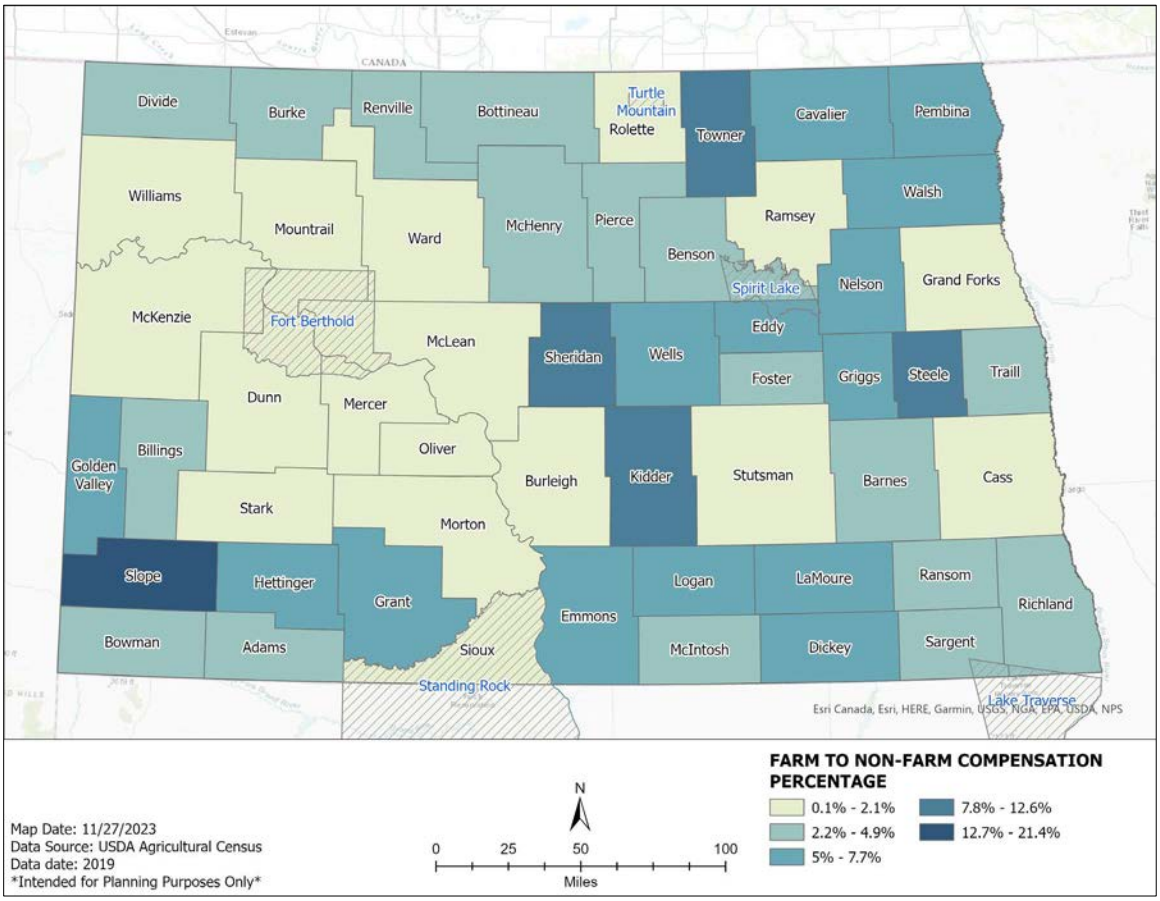
Figure 4.3-12 displays data related to the percentage of the workforce that is employed in the agricultural sector. Counties like Slope and Sheridan have more than a third of their workers in the agriculture sector. **Figure 4.3-13**: displays data related to the percent of total wages that emanate from farming. For areas shaded in blue, more than 4.8 percent of the wages generated in the local economy come from farms and may be impacted by drought. In these areas that are highly reliant on farming, drought can severely impact the economy beyond the agricultural sector. Struggling farmers can mean a significant decrease in tax revenue to municipalities, less money circulating in local businesses as farmers cut household budgets, and an increase in unemployment. Neither of these maps captures the impact on migrant farm workers who may find there is no work, reducing their inputs in local economy and in their home economies.

Figure 4.3-12: Percentage of Workers Employed in Agriculture



Source: USDA 2017 Census of Agriculture, 2019

Figure 4.3-13: Farm to Non-Farm Compensation



Source: USDA 2017 Census of Agriculture, 2019

4.3.2.2 First Responders

Periods of drought exacerbate other natural hazards, such as wildfire and extreme summer heat, which create more challenging conditions for first responders. Drought conditions can add extra mental and physical stress on rural, understaffed department personnel.

In drought conditions it is paramount for first responders to take more frequent breaks, which is not always conducive to working in emergency environments. This places first responders at higher risk for accidents, “near miss” events, delayed reactions, and injuries and overall sacrificing their health and wellbeing to provide the public services their communities and fellow citizens need.

4.3.2.3 Environmental, Natural, and Cultural Resources

The Western Prairie Fringed Orchid is North Dakota’s only federally listed plant under the Endangered Species Act. It was listed as endangered in 1984, changed to threatened in 1989, and added to the International Union for Conservation of Nature (IUCN) of Threatened Species, also commonly known as “The Red List” in 2008. According to the North Dakota Game and Fish Department (NDGF, 2023), the state is lucky to host one of the largest remaining populations of this rare plant in Ransom and Richland counties. Weather hazards such as severe drought, flooding, and premature frost are known to have an

adverse impact on flower production which decreases the ability to produce seeds and cross pollinate. Human activity in and around Orchid populations also contributes to decreased flowering of the plants.

Figure 4.2-14: The Western Prairie Fringed Orchid

Source: North Dakota Game and Fish Department, 2023

North Dakota has about 2.4 million acres of wetlands remaining from an estimated five million that once existed. The highest wetland densities are in the Missouri Coteau and Drift Prairie, collectively known as the Prairie Potholes region. Wetland classifications vary slightly, but general definitions are as follows: temporary, seasonal, semi-permanent, permanent, permanent wood-bordered, alkali, farmed wetlands, fens, and sloped wetlands.

Wetlands are some of the most valuable ecosystems on Earth. During heavy rains, wetlands absorb excess water, limiting the effects of flooding. In North Dakota, wetlands are home to an abundance of natural vegetation, birds, mammals, reptiles, amphibians, and insects. Wetland ecosystems also act as water-treatment facilities. The plants, fungi, and algae of wetlands filter waste and purify water. Nitrates and other runoff chemicals often wash into wetlands from urban areas and farms but organisms within the wetlands absorb these harmful chemicals.

North Dakota wetlands are also home to some of the seven endangered and three threatened wildlife species that live in the State. Providing habitat and a beneficial food source, wetlands are very important to the survival of these species.

Drought threatens the entire existence of wetlands and their multiple benefits. North Dakota is home to the U.S. Fish and Wildlife Kulm Wetland Management District headquartered in Kulm and a Regional Office of the nonprofit organization Ducks Unlimited headquartered in Bismarck, as both entities specifically are devoted to protecting the wetlands of North Dakota from further deterioration. North Dakota Game and Fish Department has a program dedicated to rehabilitation of previously drained or degraded wetlands with the goal of returning these resources back to their natural condition. Other State and Federal agencies dedicated to wetland management include North Dakota Parks and Recreation Department, USDA, U.S. Army Corps of Engineers, and Delta Waterfowl.

As water bodies decrease in volume and water temperatures rise during drought conditions, blue green algae can form and flourish, especially those subject to agricultural runoff. The algae can release toxins under certain conditions that can be poisonous to livestock.

4.3.2.4 Property, Facilities, and Infrastructure Damage

Although drought does not directly cause damage to property and infrastructure, it does contribute to an increase in intensity and frequency of other hazards that cause damage, such as wildfires.

While drought as an independent hazard poses low threat to property, facilities, and infrastructure, the need to protect and mitigate against drought has been formally recognized. The March 2023 publication of the Hazard Mitigation Assistance Program and Policy Guide (FEMA Number: FP-206-21-0001) added aquifer recharge, storage, and recovery projects which primarily serve as drought mitigation techniques (FEMA, 2023). These mitigation project types are designed to lessen the impacts of drought on water supplies. These activities increase surface water infiltration into an aquifer using direct well injections, infiltration pits and basins, or surface spreading where it is stored until needed.

Formally recognizing and approving drought mitigation measures demonstrates an adaptive and proactive approach in addressing drought as a hazard with high potential to become a greater threat in the future. Expansive soils in areas with high clay content, such as the Red River Valley, are very active during drought conditions. The shrinkage of the clay causes soil to separate from around and underneath structural foundations leaving them unsupported and compromising their integrity.

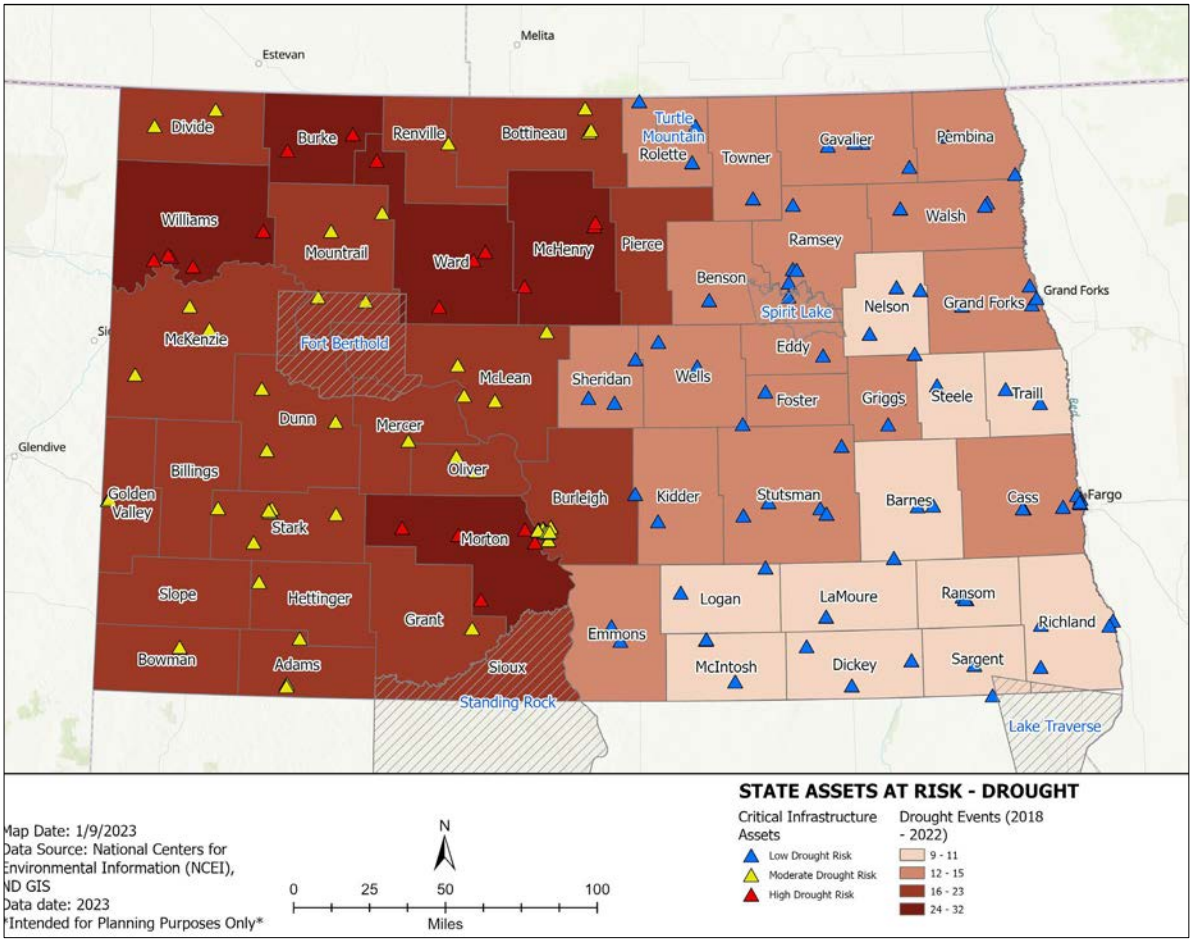
4.3.2.5 Critical Facilities, Community Lifelines, and State Assets

Drought analyzed as a standalone hazard does not pose a high risk to critical facilities and state assets, particularly assets that are not exposed externally to weather elements. Drought most directly impacts three FEMA Community Lifelines: Safety and Security, Food, Water and Shelter, and Health and Medical.

- **Safety and Security:** Drought creates extra challenging conditions for first responders when responding to emergency calls.
- **Food, Water, and Shelter:** Drought threatens crop production that is the food supply chain, can reduce or completely drain water supplies, and stresses livestock with abnormally dry living conditions.
- **Health and Medical:** Drought exacerbates poor health conditions and challenging public health situations.

Figure 4.3-15 displays the relationship between drought events and state assets. Using the NCEI drought events as an indicator of drought risk, Burke, Williams, Ward, McHenry, and Morton counties have the highest risk for drought with 24 events between 2018 and 2022 (NCEI, 2023). Collectively, there are 24 state assets in these counties, insured for a value of $13,009,184, which include government, chemical, and communications assets. The largest state asset in these areas is the $9,866,852 Correctional Facility in Mandan in Morton County (NDGIS, 2023). There are 20 counties in western North Dakota that have a moderate risk of drought. These 20 counties contain 105 state assets in agriculture, banking, communications, and government sectors. The total value of these 105 assets is $278,985,376.

Figure 4.3-15: State Assets and Drought Events



Source: NCEI, 2023; NDGIS, 2023

4.3.2.6 State Economy and Economic Disruption

The extent of economic disruption imposed by drought conditions depends on its duration and severity. Economic disruption can be experienced at an individual, neighborhood, community, regional, or statewide level.

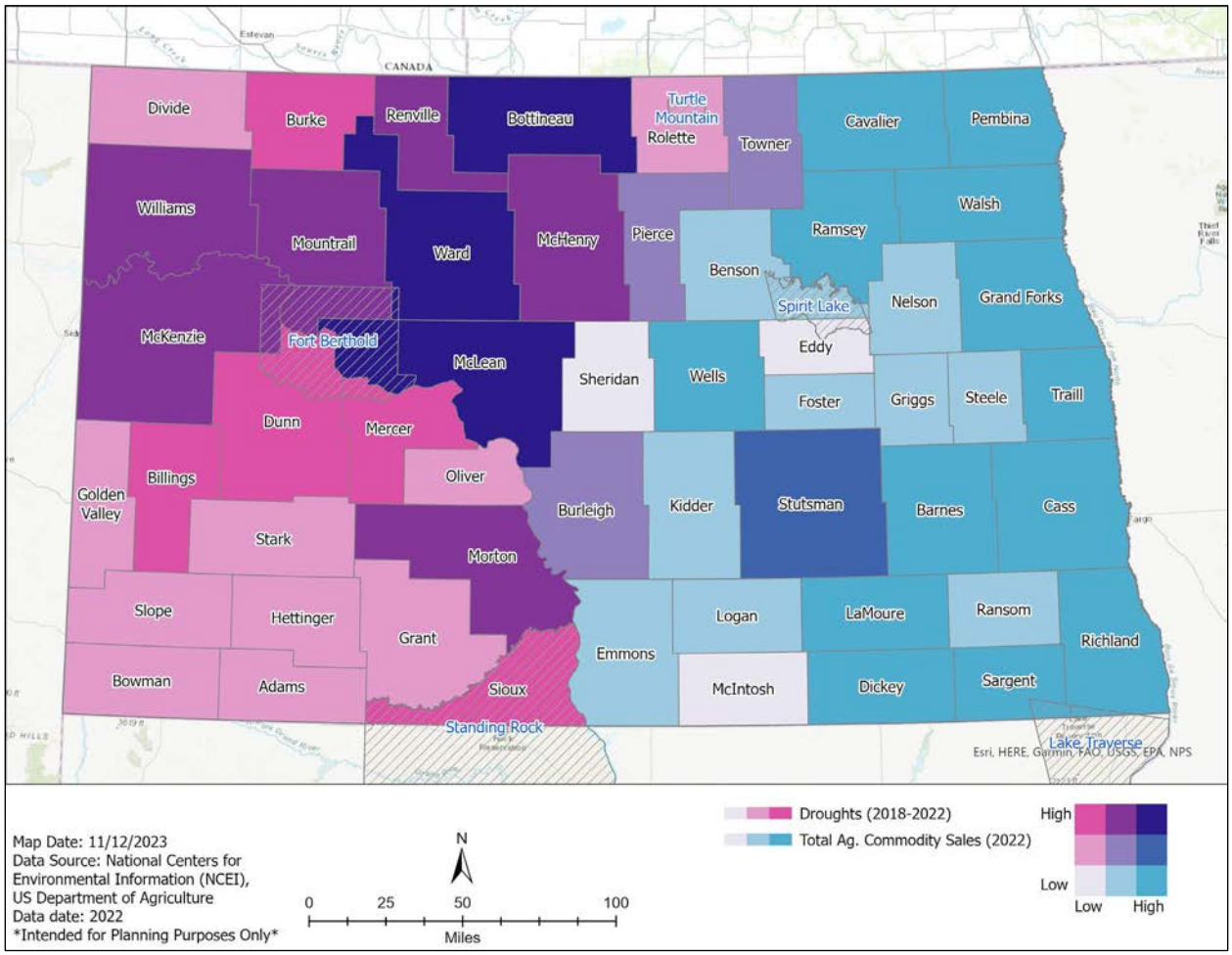
Individuals with compromised health and/or low socioeconomic conditions are those at risk to experience disruption from drought. These are individuals without the health or resources to withstand extended periods or dry heat and cannot take advantage of amenities such as air conditioning or seek enjoyable relief in recreational forms of water parks or pools. Socioeconomically depressed neighborhoods often lack open green space which is necessary to provide shade relief and keep street and building temperatures cooler.

Drought causes cascading financial challenges in North Dakota's biggest industries. For example, hay and other feed crops for raising livestock increases in price during periods of drought. This makes the cost of production increase for ranchers. In prolonged droughts, ranchers cannot always carry these increased costs long term, which results in oversupply to the market with large selloffs which in turn drives down

the cost of the supply. It creates financial instability within the smaller, local businesses and individual worker levels.

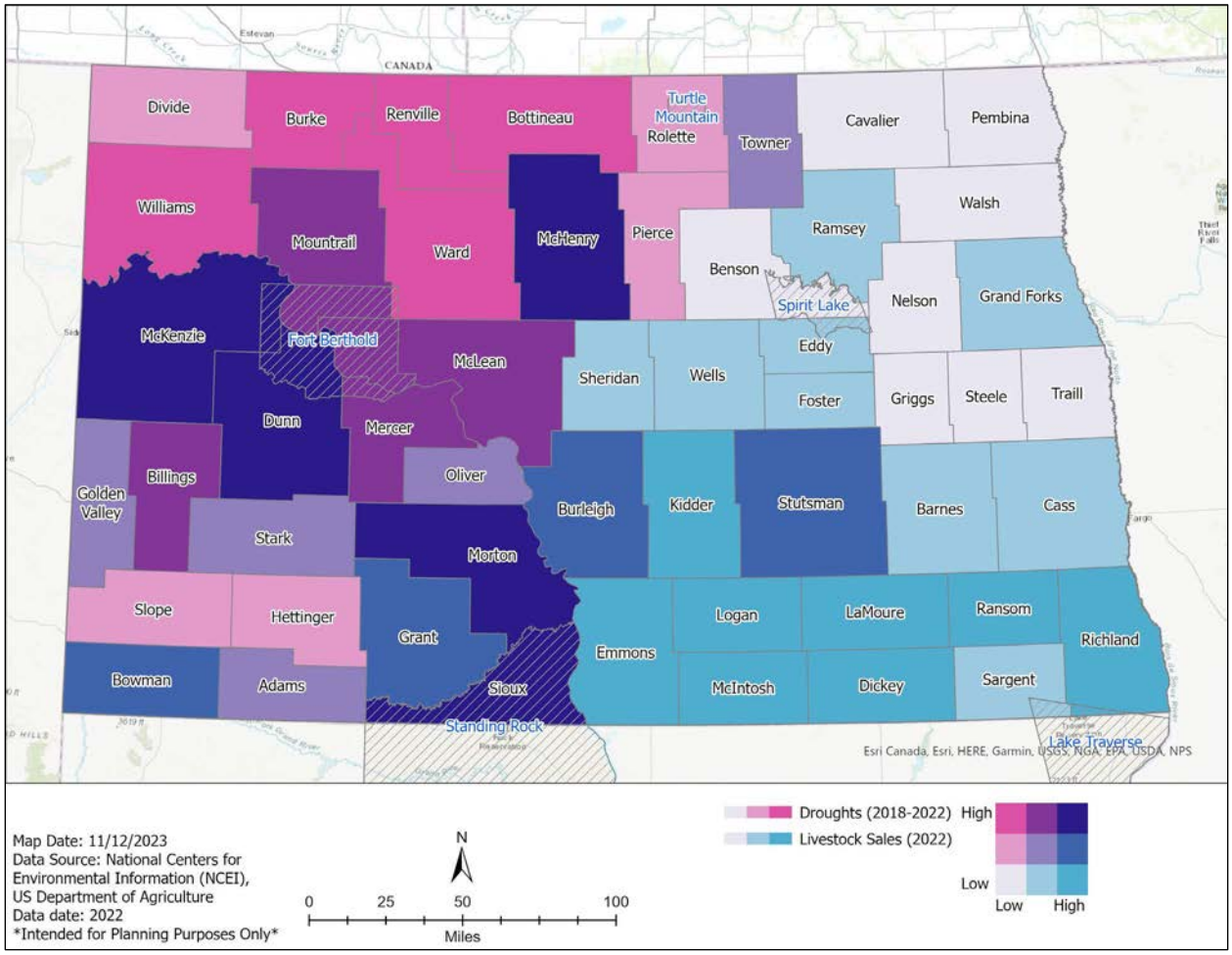
Figure 4.3-16 and **Figure 4.3-17** show sales data related to agricultural commodities and livestock. Areas that are purple and navy in these maps are those with high sales and a large number of drought events and may be those with local economies that are most heavily impacted by drought.

Figure 4.3-16: Droughts and Agricultural Commodity Sales



Source: USDA, 2022; NCEI, 2023

Figure 4.3-17: Droughts and Livestock Sales

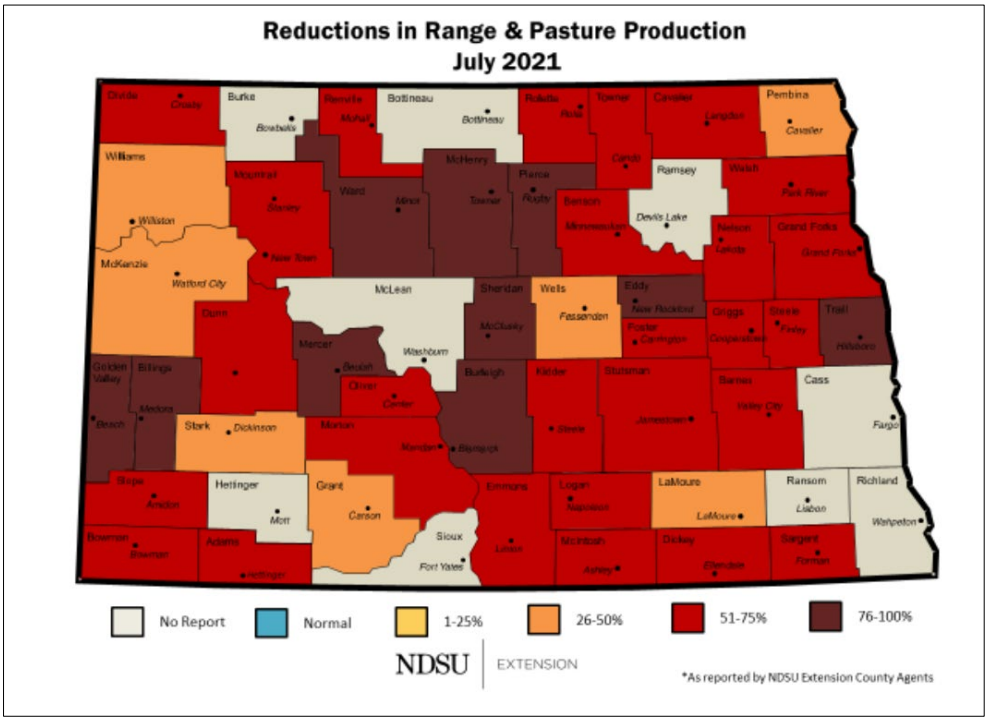


Source: USDA, 2022; NCEI, 2023

The severity of the 2021 drought created significant economic disruptions within the livestock industry. **Figure 4.3-18** shows counties that suffered reductions in the forage production of pasture and rangeland, with 10 counties seeing over 75 percent reduction rates.

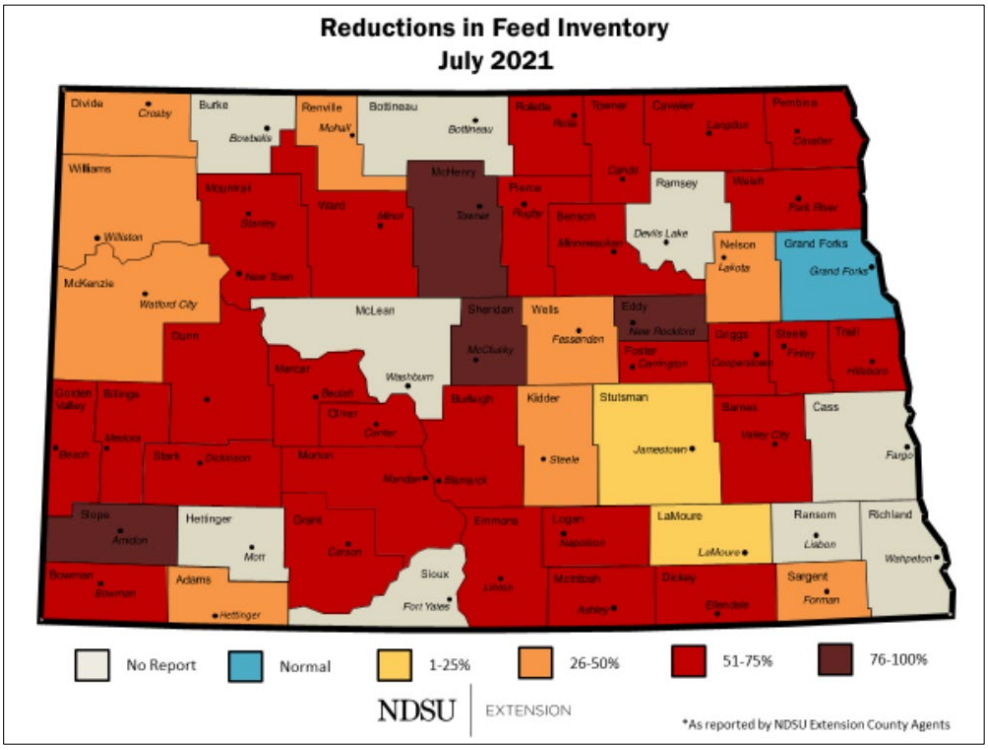
Figure 4.3-19 shows counties that suffered reductions in available feed inventory, with four counties seeing more than 75 percent reduction rates. Of these, three counties (Eddy, McHenry, and Sheridan) suffered a greater than 75 percent reduction in pastureland and feed inventory. Finally, **Figure 4.3-20**: shows counties where ranchers reported reducing their livestock herd counts. It can take ranchers that offload their livestock inventory years to rebuild their business to pre-crisis inventory levels, making for a long financial recovery.

Figure 4.3-18: Reductions in Range and Pasture Production, July 2021



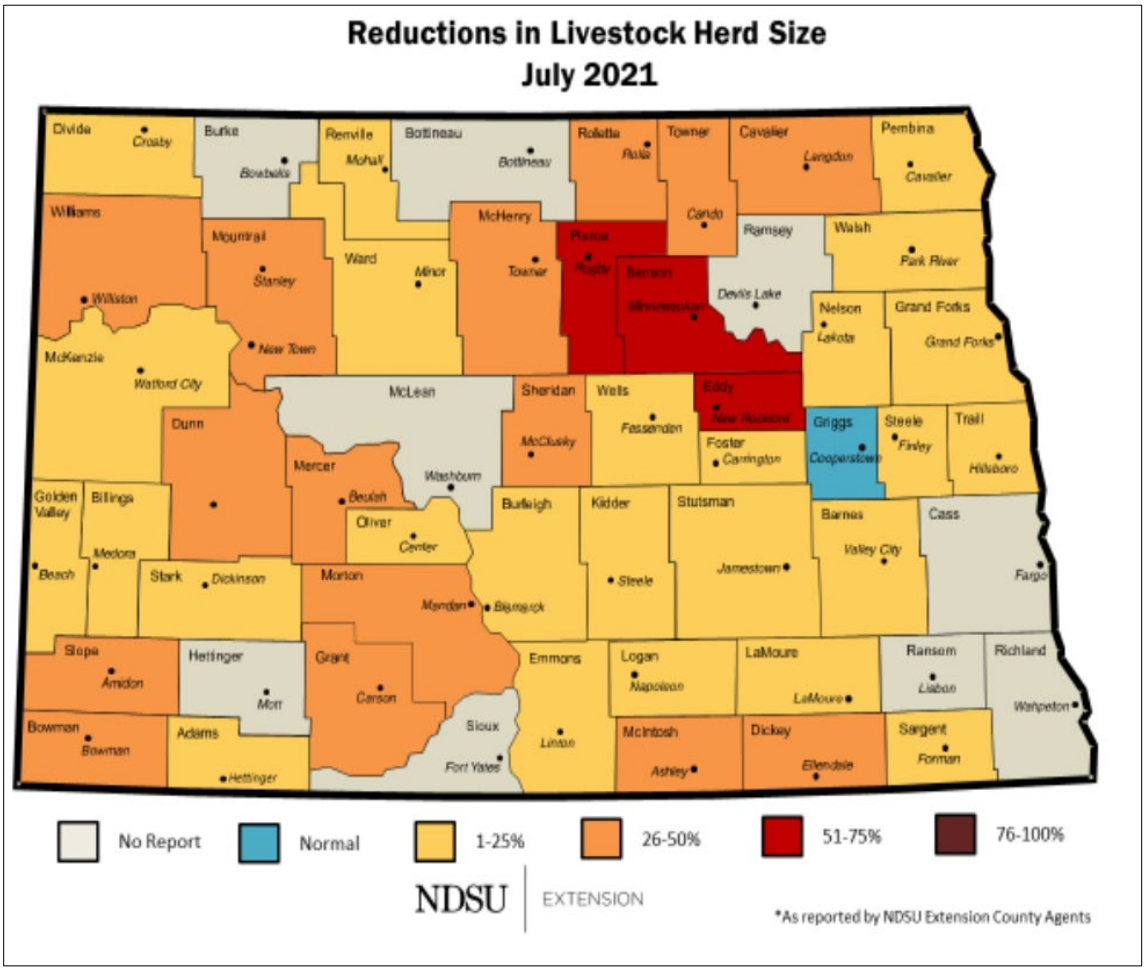
Source: North Dakota State University (NDSU) Extension County Agents, 2021

Figure 4.3-19: Reductions in Feed Inventory, July 2021



Source: North Dakota State University (NDSU) Extension County Agents, 2021

Figure 4.3-20: Reductions in Livestock Herd Size, July 2021



Source: North Dakota State University (NDSU) Extension County Agents, 2021

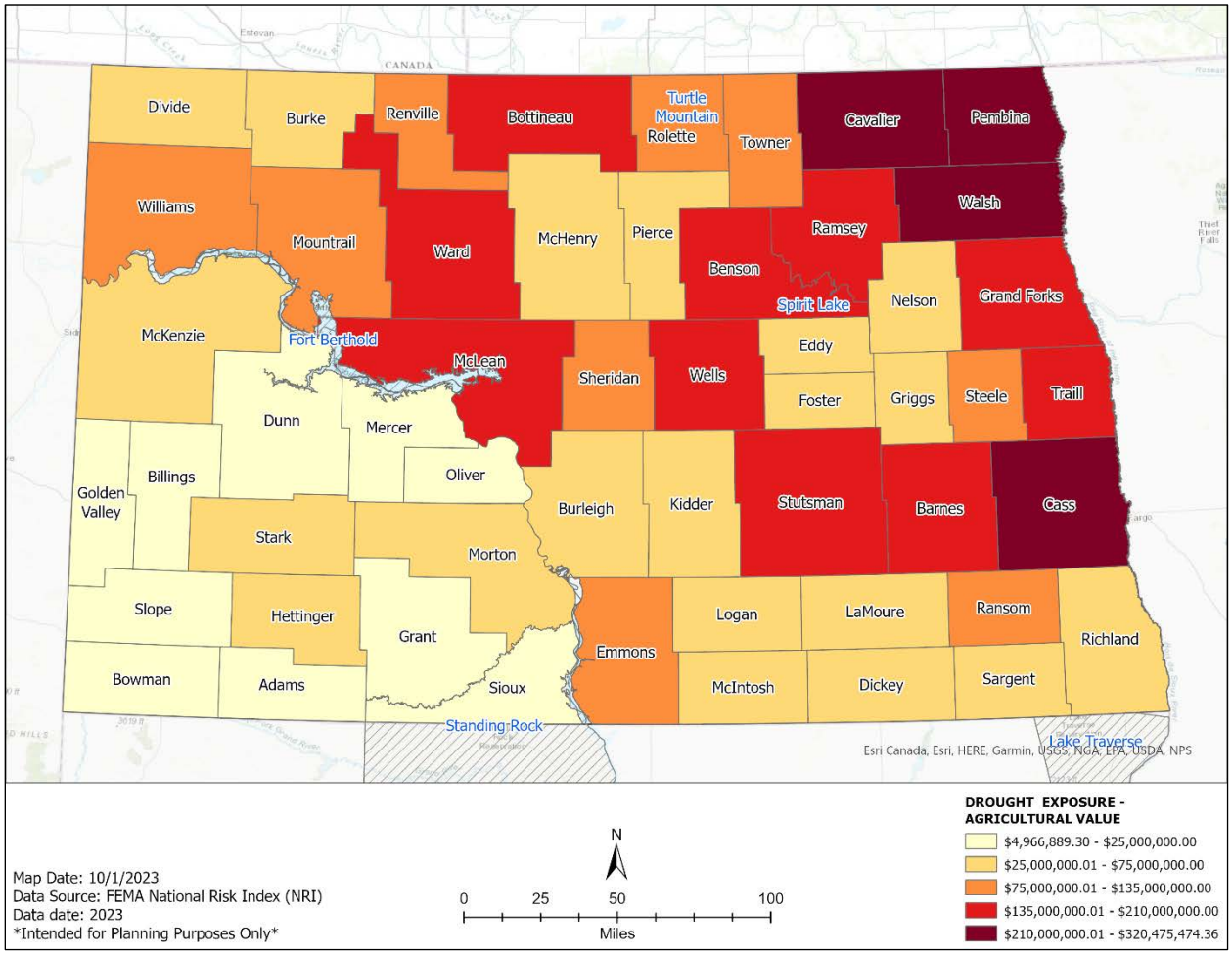
The same price disruption is also seen in the agricultural industry, or with the crop-based products.

> In fact, the Red River stopped flowing nearly every year of [the 1930s]. Those environmental conditions of scant rainfall, extremely hot temperatures, and the return of grasshoppers challenged many farmers' incomes. Years upon years of poor crop yields and prices caused many farmers and the towns that they supported to vanish. The 1930s serve as a warning sign for the residents of Cass County. The water sources upon which the economy, not to mention day-to-day life, depends upon is vulnerable. If a ten-year drought akin to the 1930s were to occur today, it would create a $25 billion impact upon the economy. *(Cass County Multi-Jurisdictional Hazard Mitigation Plan, 2019)*

Figure 4.3-21: shows the agricultural financial values exposed to drought just in calendar year 2021 to 2022 ranging in billions of dollars. Years of extreme drought that see insurance claims opposed to planted and harvested fields mean a section of the workforce was unemployed for the entire season. Even if there is outdoor labor to be performed, it is done so with reduced efficiency and less productivity because drought conditions require working less hours, taking more breaks, and taking longer breaks to remain safe and healthy.

The overall reduced productivity also applies to the construction industry workforces, the road and bridge maintenance crews, local, state, and federal parks staff, the postal service and private delivery service drivers, and landscaping professionals, to name other examples. Any professional industry that works outside in the elements suffers reduced productivity during periods of drought.

Figure 4.3-21: Agricultural Value Exposed to Drought, 2022



Source: NRI, 2023

Hettinger and Reeder both have water wells not currently in use. If a water treatment system, such as a chlorinator, were brought in, these wells could possibly be brought back online.

(Adams County Multi-Jurisdictional Hazard Mitigation Plan, 2019)

4.3.2.7 Delivery of Service and Continuity of Operations

While drought amplifies other health and natural hazard conditions, drought does not directly threaten the continuity of state operations. Drought as a standalone hazard has little likeliness of disrupting the state's ability to maintain ongoing routine business and function. In times of drought, though, there are specific assistance programs that can be activated following a state emergency declaration.

North Dakota relies on the livestock commodities produced across the state, and to ensure these services can continue the state has created emergency assistance programs that can be activated in times of declared drought disasters. One such program is the Drought Disaster Livestock Water Supply Assistance Program. Once the Governor has made an official disaster declaration naming the impacted counties, the ND Department of Water Resources has the authority to activate the program. The program provides a 50 percent cost-share, with up to $4,500 per project to help livestock producers install long term sustainable water supplies for their animals in times of drought. Examples of eligible projects include installing new water wells, rural water system connections, pipeline extensions, pasture taps and the associated works, labor, materials, and equipment rentals for work completed by the producer to develop new water supply projects.

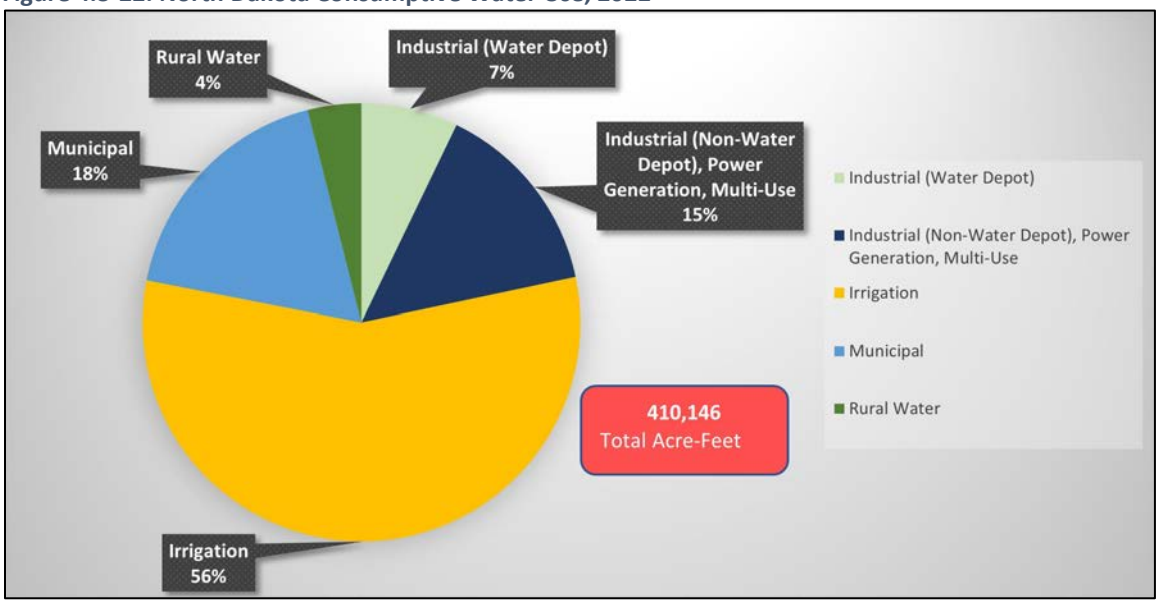
This Program was last activated in April 2021 and remained open until September 1, 2022. According to NDDWR (2023), during this activation, the program funded 1,216 projects by 826 producers with state cost-share of $4.8 million.

> High agriculture dependence in local economy could cause major economic impact and the Red River potable water supply would be challenged.
>
> *(Walsh County Multi-Jurisdictional Hazard Mitigation Plan, 2018)*

Another emergency resource activated in declared drought disasters in North Dakota is the Hay Hotline. The Hay Hotline is activated and administered by the North Dakota Department of Agriculture, originated as a phone bank resource and in 2017 progressed to GIS map based. The Hay Hotline pins where hay resources are available and serves as public information connection for ranchers looking for hay, pasture, hay land, or Conservation Reserve Program (CRP) land for their livestock. The State manages the public website and individuals contact the hotline to provide details on what they need or can provide to others in need.

Water consumption is necessary for both governments to provide fundamental necessities and businesses to operate across many industries, which becomes concerning during periods of drought that reduce water availability. **Figure 4.3-22**: categorizes five major users, which include irrigation, municipal, rural water, industrial (water depot), and industrial (non-water depot), power generals, and multi-use and breaks down their percentages consumed in 2022.

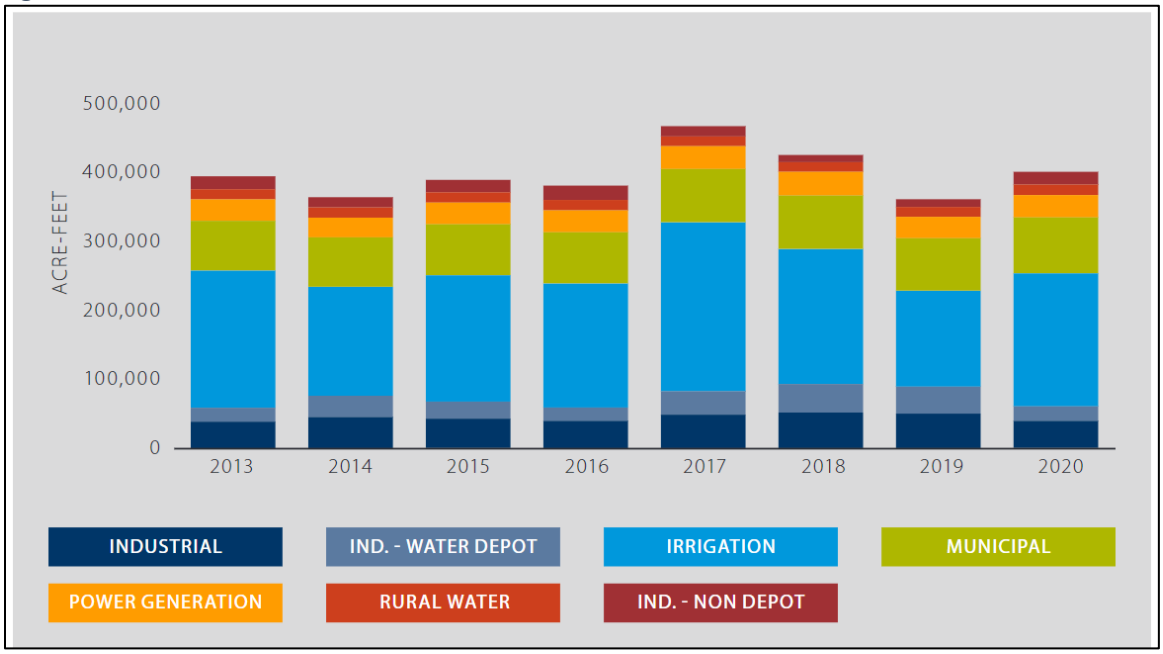
Figure 4.3-22: North Dakota Consumptive Water Use, 2022



Source: North Dakota Department of Water Resources, 2023

Extreme drought could require rationing North Dakota's water supply. Historically communities have engaged in modest water conservation actions, such as limiting how often homeowners can water their lawns. On a larger scale, rationing could be done via limiting permits. The North Dakota Department of Water Resources provides oversight to permit use, and **Figure 4.3-23**: summarizes the total water usage spanning 2013 to 2020. While North Dakota has experienced challenging drought events, they have not yet faced a drought event where lack of water availability entirely halted delivery of services or created total breakdown in continuity of operations.

Figure 4.3-23: North Dakota Permitted Water Use, 2013-2020



Source: North Dakota Department of Water Resources, 2021

4.3.2.8 Public Confidence in the State's Governance

Overall, drought is not a hazard that threatens the public's confidence in the State's Governance. The State of North Dakota has multiple assistance programs that are activated in times of declared drought and is overall proactive and responsive to the needs of the economic sectors that are directly impacted by periods of drought.

4.3.2.9 Estimation of Annual Losses

Drought, particularly the more severe and prolonged incidents, create significant financial losses to the state. The losses are felt in the agricultural and ranching sectors which are two of North Dakota's largest industries, but drought also negatively impacts the outdoor recreational activities of camping, hunting, fishing, hiking, biking, and the variety of water related recreational activities that collectively make up North Dakota's tourism industry.

Drought can be particularly hard on agriculture, which relies on predictable precipitation and heat to produce crops and livestock that are suitable to the climate of the land. Inordinate weather, such as drought, can lead to crop failure and livestock death. **Figure 4.3-24** shows the expected annual loss for agriculture as presented in FEMA's National Risk Index. The state collectively could expect a loss of $649,313.76 due to drought (FEMA NRI, 2023). Within the northern part of the state, 23 counties in all, would expect to exceed $10,000 in agricultural loss each year due to drought. North Dakota continues to diversify their crop production to ensure resilience to drought conditions and protect themselves from economic loss impacts.

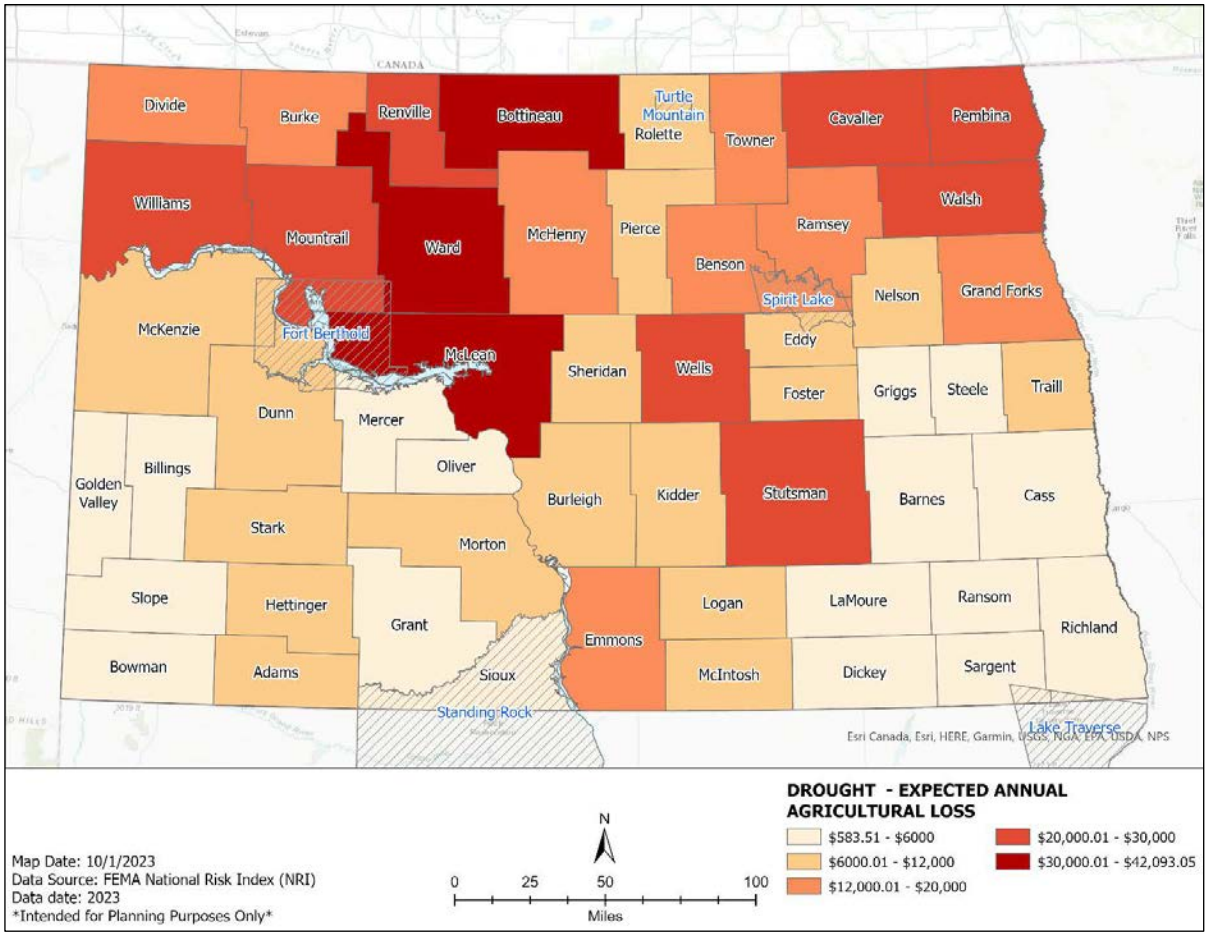
Losses to pasture and hay were thought to be over 80 percent, water quality issues were seen in early June and July and losses to crop yields were significant [in June 2017]. Both [Bowman and Slope] counties qualified for the USDA/FSA's Livestock Forage Program and the Emergency Livestock Assistance Program due to the extreme drought.

(Bowman and Slope Counties Multi-Jurisdictional Hazard Mitigation Plan, 2018)

Many public water systems extract water from surface bodies of water. If water levels become too low, public water systems may be forced to ration water or cease operation altogether. As a result, Griggs County and incorporated jurisdictions would have less access to water for fire suppression.

(Griggs County Multi-Jurisdictional Hazard Mitigation Plan, 2022)

Figure 4.3-24: Expected Annual Agricultural Loss for Drought



Source: NRI, 2023

Energy development in the county could be a potential risk to future water supplies if not pursued in a sustainable manner. Fracking is a water-intensive use that could compete with local water supplies during times of drought. Additionally, spills of oil and byproducts from oil extraction could jeopardize county aquifers and rivers. A large spill that pollutes an aquifer or river could result in a health crisis for residents or cattle, and significant economic damages for agricultural producers. The impacts of a spill could be exacerbated during times of drought when water supplies are scarce.

(McKenzie County Multi-Jurisdictional Hazard Mitigation Plan, 2020)

The NRI dataset only uses data from 2000 and 2022. The U.S. Department of Agriculture Risk Management's Agency includes all crop insurance claims made during the plan update period for crop losses related to drought. **Figure 4.3-25** shows crop insurance indemnity payouts by commodity and by the worst-impacted counties. Soybeans and wheat were the crops most impacted by drought, each with an annualized loss exceeding $100 million. For the period of study, the total loss was more than $1.91 billion with an annual loss exceeding $382 million in crop indemnity amounts. Eight of the state's 58 counties experienced more than $10 million in annual losses since 2017. McLean took the biggest hit with more than $148 million total loss (USDA, RMA, 2023). **Figure 4.3-26** displays the same data distinguished by county.

Figure 4.3-25: Crop Indemnity Amounts by Commodity, 2017-2023

Commodity	Amount	Annualized
Soybeans	$552,231,122.78	$110,446,224.56
Wheat	$519,914,130.55	$103,982,826.11
Corn	$439,327,337.46	$87,865,467.49
Dry Beans	$122,650,685.01	$24,530,137.00
Canola	$116,715,217.12	$23,343,043.42
Dry Peas	$41,893,978.98	$8,378,795.80
Barley	$28,741,901.38	$5,748,380.28
Sunflowers	$24,755,327.40	$4,951,065.48
Oats	$14,842,215.33	$2,968,443.07
Flax	$13,423,565.20	$2,684,713.04
Sugar Beets	$11,464,176.60	$2,292,835.32
Potatoes	$10,524,856.80	$2,104,971.36
Forage Product	$9,246,088.05	$1,849,217.61
Buckwheat	$2,020,654.65	$404,130.93
Rye	$1,718,785.58	$343,757.12
Other Crops	$1,304,051.20	$260,810.24
Mustard	$719,941.20	$143,988.24
Forage Seeding	$539,163.98	$107,832.80
Safflower	$116,738.80	$23,347.76
Millet	$12,403.00	$2,480.60
Total	**$1,912,162,341.07**	**$382,432,468.23**

Source: USDA RMA, 2023

Figure 4.3-26: Crop Indemnity Amounts by County, 2017-2023

County	Indemnity Amount	Annualized Loss
McLean	$148,378,107.57	$24,729,684.60
Ward	$97,852,044.77	$16,308,674.13
Emmons	$97,266,690.34	$16,211,115.06
Wells	$76,082,992.24	$12,680,498.71
Burleigh	$73,893,147.07	$12,315,524.51
McHenry	$73,297,944.97	$12,216,324.16
Stutsman	$62,513,588.31	$10,418,931.39
Pierce	$60,011,333.38	$10,001,888.90
Morton	$58,609,052.41	$9,768,175.40
Walsh	$53,448,263.12	$8,908,043.85
Benson	$53,183,937.32	$8,863,989.55
Total	**$854,537,101.50**	**$142,422,850.26**

Source: USDA RMA, 2023

4.3.2.10 Community Resilience

Most of the public adapts to drought periods and conditions with minimal disruptions or modifications to normal, daily lives and routines. It is vulnerable populations within the public that experience the negative impacts of drought, such as individuals that lack air conditioning in their residence, individuals who rely on public transportation, individuals who are health compromised or sensitive to hot and dry conditions, such as the elderly population, and individuals by nature of their employment are exposed to working outside in the weather elements. Communities across the state have engaged in a variety of efforts to provide comfort to citizens during periods of drought, ranging from providing vouchers to low-income individuals and families to purchase air conditioning units for their homes, to waiving or reducing fees to public swimming pools, or extending the operating hours of public swimming pools. The North Dakota Department of Human Services and the North Dakota Department of Commerce in collaboration with the Community Action Partnership of ND (CAPND) provide a Low Income Home Energy Assistance Program (LIHEAP) to purchase or repair air conditioners and/or other cooling devices.

Throughout the span of three years, ranch families of McKenzie County experienced the most extreme drought in recent history. Persistent drought conditions led to many cascading impacts for communities across the state. Producers took a hard hit with stunted crops, dried out fields that created an environment for, and a grasshopper invasion (NDDES Annual Report, 2022). These conditions created incredulous impacts that sought no relief. Rural populations driven by agriculture suffer in the short term and long-term from the persistent drought impacts that have been experienced from 2018-2023.

4.3.2.11 Future Conditions

Through the end of this century, expect larger and more intense droughts, with increasing frequency and/or longer duration of drought periods in North Dakota. The following list is based on information extracted from the NOAA National Centers for Environmental Information, summary for North Dakota (Frankson, 2022), the 5th National Climate Assessment (Knapp, 2023), and related resources:

- **Location**: Drought is a threat throughout the state. Location is not projected to change.
- **Extent/Intensity:** Drought is projected to increase in extent and intensity.
- **Frequency**: Drought is projected to increase in frequency due to temporal shifts in seasonal precipitation patterns, including drier summers and less snowfall accumulation in spring or fall.
- **Duration**: Drought is projected to have a longer duration due to shifts in seasonal precipitation patterns, including drier summers and less snowfall accumulation in spring or fall.

Drought is defined as “a period of abnormally dry weather sufficiently long enough to cause a serious hydrological imbalance” (AMS: Drought, 2023), but is also relative to the long-term normal in precipitation and temperature for a location that may occur during different seasons of the year and so affect soil infiltration, crop growth, and water supplies (NDMC: Drought Basics, 2023). Three new

Drought Types have been added since the 2018 MAOP: Snow Drought, Flash Drought, and Ecological Drought:

- **Snow Drought:** Snow Drought is a period of low snowpack accumulation for a season due to either abnormally dry snow or lack of snowfall (AMS, 2023; Harpold et al., 2017).
- **Flash Drought**: Flash Drought is "an unusually rapid onset drought event (or one that is) characterized by a multiweek period of accelerated intensification that culminates in impacts to one or more sectors" (agricultural, hydrological, etc.: AMS: Flash Drought, 2023). Flash droughts are distinguishable from more conventional, more slowly developing droughts because of this rapid rate of intensification (Otkin et al., 2018).
- **Ecological Drought**: Ecological Drought is defined as an "episodic deficit in water availability that drives ecosystems beyond thresholds of vulnerability, impacts ecosystem services, and triggers feedback in natural and/or human systems" (Crausbay, 2017, p.2544). NIDIS-Drought.Gov (2023) further specifies that, Ecological Drought may be driven by natural phenomena, such as lack of rainfall and/or warming temperatures, and it may result in multiple competing demands on existing limited water supplies or be exacerbated by such demands.

Studies show that the future vulnerability of forests, for example, is being underestimated at the global scale and that large-scale ecological changes are likely to become more common as climate change drives more extreme high temperatures (Allen et al., 2015). A hotter and thirstier atmosphere could lead to "faster onset, longer duration, and altered timing of drought conditions that cross ecological thresholds", creating "novel forms of drought ... globally, challenging our ability to anticipate and manage drought impacts" (Crausbay, 2020, p.337). These three newest drought types may portend a series of additional drought types to consider in the future.

Wildfires are often thought to be a seasonal hazard associated with warmer months. However, following continued drought, Adams County experienced a fire that erupted on January 14, 2020. The fire destroyed over 20,000 acres of combined farmland and grass lands within and outside of the county resulting in the destruction of 19 occupied farms with two firefighters hospitalized (NDDES Annual Report, 2022). Strong winds catalyzed the fire resulting in a major event for the communities. Rural citizens were displaced with limited options in the area for hoteling.

While most local and tribal plans acknowledged the impact to agriculture, some areas identified additional vulnerabilities related to drought. The Standing Rock Sioux Tribe/Sioux County (2016) acknowledged past and possible future impacts to the potable water supply when water bodies run low, as well as an elderly population who may be less resistant to drought conditions. Hettinger County (2019) also acknowledged a risk to potable water, but was more reliant on groundwater, and suggested water conservation activities for New England, Mott, and Regent, while calculating that drought directly impacts 50 percent of the county's population. Stutsman County (2021) discussed the social impacts, including mental health impacts on struggling farmers. It also considered the long-term impact on resources from repetitive droughts, including the reduction of herd sizes, and the migration of residents out of the county. As droughts continue, these pressures may lead to increasing population migration to

cities and away from rural areas. Morton County (2020) looked to increase living snow fences as a method to hold more moisture in the ground and was concerned about the impacts to recreational economies as wildlife struggles with prolonged drought conditions. Recreational areas can be impacted to the point of closure or sale if droughts become regular. Burke and Divide Counties (2019) recognized the vulnerability of communities like Powers Lake, Bowbells, and Crosby that serve as agricultural service centers, and are thus indirectly reliant on farm income. Agricultural firms and co-ops struggle in drought, as do fishing and other recreational areas, as farmers have less time for recreation. These counties also acknowledged a risk to rural water resources reliant on shallow wells which dry up quickly. It also indicated that while crop insurance may keep farmers afloat, most farms insure 70 percent of their crop value, reducing the local economic resources and tax income by 30 percent. These vulnerabilities are repeated in other areas of the state. Williams County (2017) has the opposite issue. Growth in development accompanies the growth in oil labor. In time, fracking and increased residential water use threaten to exceed the current water supply, which had a 30 percent margin in 2017. Williams was not the only community worried about exceeding their existing water supply, as Stutsman, Hettinger, and Burke mentioned these concerns as well.

4.3.2.11.1 Extreme Climate Variability and Climate Change

Through the end of this century North Dakota's natural yet extreme climate variability will likely continue to be the primary influencer or signal within each natural hazard (Frankson, 2022). This may directly or indirectly impact jurisdictions and peoples across the state over days to decades long timescales, while the much more subtle and gradual trends of climate change over the rest of this century may act to further extend the range of such variability (Knapp, 2023). Such studies show that both trend and variability could extend beyond that which has previously been documented in the historical record.

Recent climate change trends have shown, and future projections suggest that the state can expect continued gradual warming in all seasons, with greatest warming in the winter season. Overall precipitation is likely to increase, but with a high degree of inter-seasonal and interannual variability, which could lead to longer and stronger droughts interspersed with more frequent and more intense flooding (Swain, 2015). Severe summer and winter season storms will likely continue to occur in both drier, drought-prone periods, and wetter, flood-prone periods within the state's overall extreme climate variability.

Drought and Flood Cycles in North Dakota will likely increase in frequency and intensity.

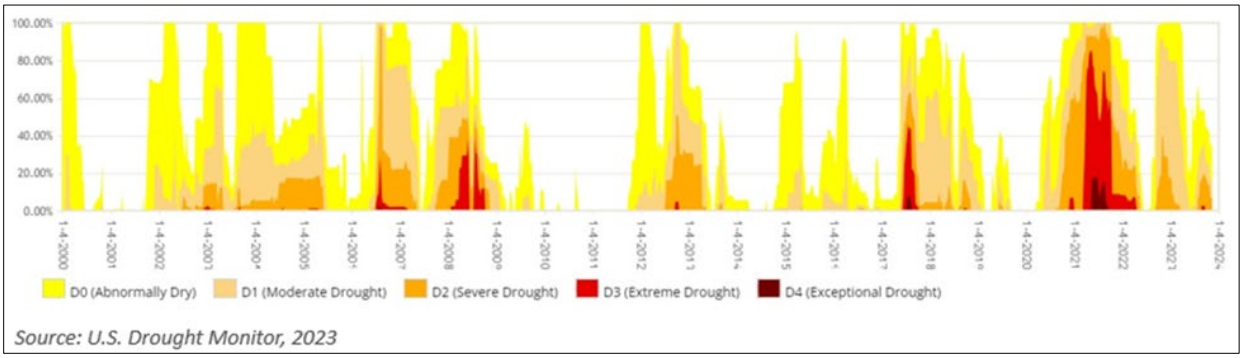
Recent decades have seen an increase in precipitation across North Dakota, with an overall lower frequency in drought conditions during a recent protracted wet cycle, with conditions from 1993 to 2019 considered to be part of the region's natural variability (Hoerling et al., 2010; Hoerling et al., 2013; Hoell et al., 2023). Just as Flash Floods can occur under conditions of more intense precipitation, Flash Drought can occur under conditions of drier conditions and higher overall temperatures (Otkin, 2018). Rapidly changing landscape conditions, expected to increase under Future Climate scenarios, will likely lead to a more frequent incidence of destabilization of many geologic features (FHWA, 2023). Under future climate conditions, the rapid cycling of flood-to-drought and drought-to-flood should also increase.

In North Dakota, and the NGP region in general, Drought/Flash Drought conditions can occur in rapid sequence with excessive wetness and Flood/Flash Flood episodes, from one month or season to another, even one year to another (Hoell et al., 2020). An area that is in drought can also experience brief, embedded periods of flooding or flash flooding, and increased wildfire activity, burn scarred landscapes, and reduced evapotranspiration can further increase runoff rates and both wind and water erosion during periods of drought (Williams, 2022). Landscape or ecological conditions can be such that an intense or excessive rainfall event leads to a high runoff rate and is therefore unable to ameliorate local drought conditions. And one area of the state or a county can be in drought, while another area can be excessively wet and flooding (NCEI, 2023). Recent examples include the 2011 flood/2012 drought/2013 flood sequence; the 2017-2018 drought/flash drought into 2019 flood sequence; and the 2021 extended drought/flash drought, with embedded flood and flash flood episodes.

For example, widespread moderate to severe drought (D1-D2) developed across the state from late summer through the fall of 2020, while the 2020-21 winter received only half the long-term normal snowfall. The abnormally bare and dry soils of the late fall were followed by an early spring snowmelt, with a greater than normal evaporation of soil moisture starting in March of that year from increasingly uncovered and thawed soils. By late April 2021, 98 percent of the state was in drought, with 83 percent in extreme drought (D3). And by late May, 18 percent of the state was in exceptional drought (D4).

Figure 4.3-27 shows the percentage of the state covered by the different drought categories as expressed by the U.S. Drought Monitor, since its inception in January of 2000. The most extensive drought period during this period overlapped portions of 2020, all of 2021, and into spring of 2022.

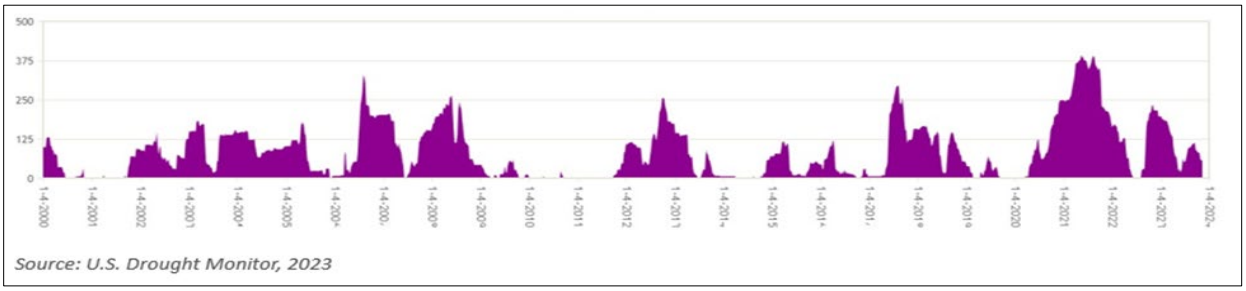
Figure 4.3-27: North Dakota Percentage of Area in U.S. Drought Monitor Categories, 2000-2023



Source: U.S. Drought Monitor, 2023

Figure 4.3-28 depicts the overall Drought Severity and Coverage Index (DSCI), using a scale developed by the North Dakota state Climatologist, Dr. Adnan Akyuz (Akyuz, 2017). Nationwide statistics are now automatically calculated and rendered in tabular or graphical form for several areal fields ranging from national, through state, hydrologic basin, or county levels (Johnson et al., 2020). The abrupt intensification of drought in the spring of 2021 pushed North Dakota's DSCI above 300 for the first time this century, on 23 March 2021, peaking at a DSCI of 393 on 25 May 2021, and remaining above 300 until 12 October 2021.

Figure 4.3-28: North Dakota Drought Severity and Coverage Index, 2000-2023

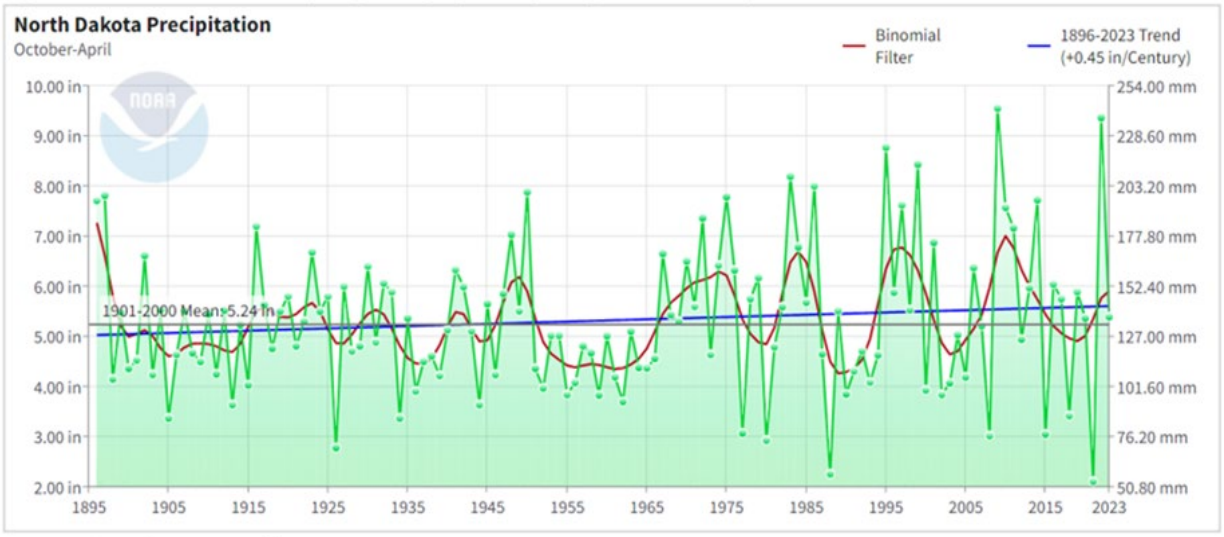


Source: U.S. Drought Monitor, 2023

Markedly below normal snowmelt runoff during the spring of 2021, as a result of the 2020-21 winter season snow drought, led to reduced water-hole recharge and stream/river flow. The spring and early summer periods saw a rapid warm-up with continued below normal precipitation and with rapidly increasing flash drought conditions into mid-July. Yet even a few small footprint, high precipitation thunderstorms managed to form on July 15th, 2021, and produced sub-township scale heavy rains of from 3 to 6 inches, in 1-3 hours, across portions of Traill and Grand Forks Counties (NCEI/Storm Data, 2023). Thus, flash flooding can coincide with flash drought as illustrated further, below.

In North Dakota, rainfall that occurs late in the fall season often accumulates in the uppermost layers of the topsoil as either tension or free water (NWS/Soil Moisture, 2023), and with the extremely low evaporation rates of late season rainfall and subsequent winter snowpack, most of this accumulated cold-season moisture remains available for the spring snowmelt runoff cycle (Rogers, 2013). **Figure 4.3-29** depicts the current trend in frequency and intensity of both spring onset drought and spring flooding, as a function of the precipitation from October through April.

Figure 4.3-29: North Dakota Spring Drought/Flood (Precipitation Runoff) Potential, 1895-2023



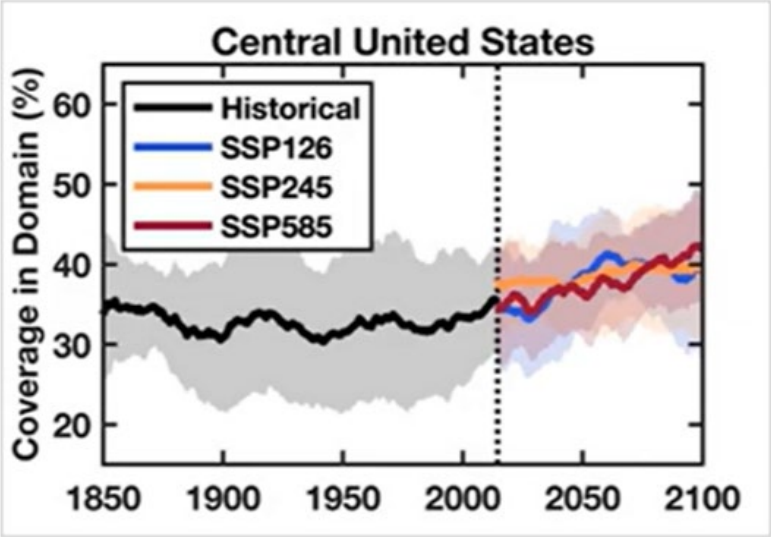
Source: NOAA Climate-at-a-Glance, 2023

In Figure 4.3-29, the trend in frequency and intensity of spring onset drought (Oct-Apr precipitation below the mean) shows a sizeable increase from the mid-70s through 2023, with spring 2021 and 1988 as first and second placeholders, in statewide records back to 1985 (Gust, 2022; NCEI, 2023). Looking at points above the mean, spring 1997, 2009, and 2022 stand out for their statewide spring flood potential. Such prospects for an increased flood frequency are discussed in more detail in section 4.1.

As mentioned earlier in this section, the overall prospects for drought are also projected to increase through the rest of this century. The NCA5 specifically identifies that, “Recent droughts in the upper Missouri River Basin between 2000 and 2010 were the most severe in the instrumental record, and flash droughts are a growing concern” (Knapp, 2023, p. 25-10). Recently, the National Integrated Drought Information System (NIDIS) program sponsored a second National Flash Drought Workshop (NIDIS, 2023). Such efforts recognize the need to develop additional collaboration and coordination among those within the research and operations communities involved in development of the science, resources, and tools related to flash drought.

Figure 4.3-30 depicts the projections for flash drought frequency through the rest of this century, based on various emission scenarios developed under CMIP6 and expressed as a percentage of coverage across the Central U.S. study domain, which included North Dakota (Cristian, 2023). As mentioned in Chapter 3, the more recent and higher resolution CMIP6 projections do indicate somewhat less intense warming across the central U.S. and adjacent portion of central Canada than earlier models, though the prospects for steadily warming temperatures ***along with an increasing frequency of flash drought*** persists under all of the most current emission scenarios.

Figure 4.3-30: Central U.S. Flash Drought Projections, based on CMIP6.



Source: Cristian, 2023

4.3.2.11.1.1 Impact

Impacts of drought can include shrinkage of clay soils forming deep cracks and causing soil to pull away from building foundations or other structural elements. Heavy rains which develop over drought-stricken lands often produce increased erosion as rushing runoff digs more deeply into deep soil cracks. As vegetation withers and soils crack, wind and water erosion can increase across fields and rangeland, on the sides of roadbeds and other more highly sloped terrain, in soil cracks along earthen spillways and alongside edges of concrete revetments or spillways, thus increasing the risk of future structural damages (FWHA, 2023). Water can more easily penetrate the soil cracks near building foundations leading to leakage into basements and weakening foundation supports. Low water levels in streams and rivers may lead to undercutting of the streambank/riverbank and subsequent riverbank collapse.

Drought influences various economic sectors and increased drought size, intensity, frequency, and/or duration could lead to increased economic impacts.

Extreme Heat/Heat Index Days will likely increase.

> A majority of North Dakota cattle producers rely on dugouts or stock dams for their cattle's drinking water, but those sources rely on surface water runoff, which North Dakota has had very little of over the past year-and-a-half.
>
> *(Adams County Multi-Jurisdictional Hazard Mitigation Plan, 2019)*

Projected increases in temperature through mid-century, based on a high emissions scenario, would likely increase the number of days with a heat index above 100F by the equivalent of 1-7 workdays, in North Dakota, increasing from northwest to southeast across the state. Research suggests that the increased number of work breaks required by OSHA for outside workers would accumulate as unsafe work time and put worker's earnings at risk (Dahl & Licker, 2021), though the increase in available workdays due to a projected shorter winter season snow-cover may offset the loss in time/workdays due to the projected increase in summertime extreme heat. In general, the impacts of more/longer Extreme Heat episodes during a drought include increased human, animal, and crop stresses.

Through the end of this century, the potential increase in size, intensity, frequency, and/or duration of drought periods coincides with similar potential increases in heavy rain episodes, flood/flash flood episodes, and/or cascading impacts.

Cascading impacts are those that are exacerbated by either sequential or coincidental factors, either natural or anthropogenic in origin (Crausbay, 2020). All drought types can cause or contribute to cascading impacts in ecological environments and human communities, including those that are primarily driven by natural conditions and those that may be human-induced and/or human-modified.

Drought conditions have a positive feedback loop, where the conditions that drought produces (excess heat, dry soils, vegetation desiccation, etc..) tend to lead to more drought (Hartick et al., 2022; Zhou et al., 2019). From a duration standpoint, the old adage (unattributed) that "Drought begets drought" seems to hold.

4.3.2.11.1.2 Adaptation

Adaptation actions traditionally include efforts to increase diversity in crops, livestock, and forests; develop irrigation practices and water conservation efforts; and maintain overall ecosystems health. The USDA Natural Resource Conservation Service (NRCS, 2023) and the Farm Service Agency (FSA, 2023) provide agronomist or rangeland specialists to advise on cropping strategies or to develop diversification in grazing systems. Most of these are also associated with hazard mitigation efforts as further discussed below.

4.3.2.11.1.3 Mitigation

With a potential for increased size, intensity, frequency, and/or duration of both heavy precipitation (with flooding) and drought there should be an increased emphasis on longer-term mitigation strategies that reduce exposure to extremes of drought and flood and strategies that minimize cascading effects, including rapid changes from drought to flood and flood to drought.

(Note: always contact appropriate jurisdictional engineering and authorities for recommended actions or modifications.)

- **Agriculture/Cropping Strategies:** Field erosion may be reduced through low-till, no-till efforts, and through increased green edging setbacks along drainage ditches. According to NRCS (2023), extreme drought conditions can reduce the effectiveness of such mitigation efforts as vegetation wilts or dies, though some benefits will generally remain.
- **Rangeland/Cropping strategies: I**nclude grazing management and implementation of a grazing system that enhances resilience. Develop water sources that reduce reliance on surface water, ensuring grazing livestock have adequate, good quality water (Haigh, 2018; Derner, 2017; Smart et al., 2021). Consider the development of drought plans for ranches.
- **Forest Thinning and Care:** In climates subject to such extreme variability in temperature and precipitation as North Dakota, our native forests, rural shelterbelts, parks, greenways, and urban streetscapes can all benefit from proper forest thinning to help maintain forest health and reduce the impacts of drought, when it occurs. Appropriately thinned stands can reduce gross moisture needs, limit the spread of pests and diseases, increase herbaceous growth, and forage for wildlife, and reduce the risk of catastrophic wildfire while reducing blowdown and/or windthrow potential. (Safford et al., 2013; Johnson, 2021; Claeys, 2020). Also, both urban and rural forests could benefit from the introduction of drought/heat tolerant varieties at 5-10 percent per year.
- **Wetland Maintenance.** In using downscaled CMIP5 and an improved Prairie Pothole Model (PHyLiSS: Pothole Hydrology Linked System Simulator model), ND-based researchers have found that the new method shows some variation in overall May Pond numbers, and "When combined, our results suggest areas in the PPR that currently support the highest densities of intact wetland basins, and thus support the largest numbers of breeding-duck pairs, will likely also be the places most critical to maintaining continental waterfowl populations in an uncertain future" (McKenna et al., 2021. Translation: concentrating on overall wetland health and preventing additional wetland drainage may be the best strategy, since the Prairie Potholes appear to have a robust resiliency (personal conversation with author).
- **Transportation:** According to the NDDOT Long Term Transportation Plan (2023), soil crack repair or filling on roadbeds and spillways could include reseeding methods that protect new growth and disturbed soils from the added erosive action caused by subsequent heavy rain episodes.
- **Dam Safety:** Efforts are underway to increase overall reservoir and/or spillway capacity (USACE, 2023; USBR, 2023; NDDWR, 2023). For example, upgrading earthen spillways may help reduce certain erosion possibilities that could increase as both drought and flood increase in size, intensity, frequency, and/or duration (FWHA, 2023). Jurisdictions should contact local or state engineering for aid in assessing appropriate actions.
- **Water Supply/Water Quality:** The State of North Dakota has been investing for decades in upgrades and expansions of water supply systems that greatly improve resiliency to drought. The Department of Water Resources and State Water Commission Cost-Share Program provides up to 60 percent and 75 percent cost-share assistance for municipal and regional/rural water supply projects, respectively (NDDWR, 2023). The establishment of well-defined thresholds for implementing water restrictions at different levels can help mitigate drought impacts. Nutrient management can be used to address some water quality concerns, such as Harmful Algae Blooms (HABS) (Keana et al., 2022; Meehan & Mostrom, 2021).

- **Human Health:** Both adaptation and mitigation measures would likely involve careful monitoring of geologic hazard prone areas, with rapid response to control access to damaged and/or dangerous areas and to complete any needed repairs (NDPSC, 2023). Zoning restrictions can help reduce the likelihood of having homes and businesses located in or near hazardous areas.
- **Socio-Economic:** The Bank of North Dakota (BND) has recently hired a Sustainability Officer to help plot an economic course for dealing with future climate conditions in the state (BND, 2023). Other state agencies are engaged in pooling such efforts/resources enroute to more integrated state action planning, much as has been done as part of this Enhanced State Hazard Mitigation Plan.
- **Vulnerable Populations:** Education efforts are likely needed to ensure both new and established residents, or those with special needs, are aware of areas prone to drought, flood, or geologic hazards (ND Mitigation Strategy Mtg., 8 Nov 2023; NDHHS-CEU, 2023). Resources should be made available to assist in buyouts/relocations as conditions warrant.
- **Energy Production and Use:** The Bakken Oil Boom led to a dramatic increase in construction, traffic, and overall transportation and land-use changes (NDDMR, 2023). This has necessitated dramatic increases in infrastructure, regulation, and repair/maintenance.
- **Tribal/Local:** During the 2023 North Dakota Legislative Assembly, the passage of House Bill 1385 provided the ability of the State Water Commission to enter into agreements with Tribal Nations – making them eligible for funding assistance through the Cost-Share Program (NDGO, 2023; NDDWR, 2023). The Department of Water Resources and State Water Commission Cost-Share Program provides up to 60 percent and 75 percent cost-share assistance for municipal and regional/rural water supply projects, respectively.

Additional mitigation strategies are discussed within the Transportation, Flood, and Drought Hazard profile sections, and the Severe Summer and Severe Winter Weather Hazard profile sections.

4.3.2.11.2 Other Changes

The urban areas of the state are anticipated to have a 24.6 percent growth rate between 2020 and 2040 (U.S. Census Bureau, 2022). Areas in and near Fargo, Grand Forks, Bismarck, and Williston will see more infill development and development on their fringe and nearby smaller communities, increasing the amount of municipal water needs in these areas.

The Western North Dakota Counties of Dunn, McKenzie, Mountrail, and Williams have grown at a rate of 72.3 percent since 2010 (U.S. Census Bureau, 2022), and growth is expected to continue at a rate of 54.9 percent. This has already led to new development in areas like Williston, Minot and Dickinson and the rural areas between them, increasing the municipal water need, while simultaneously increasing the need for industrial use for extraction industries, which can be water intensive.

4.3.3 Risk Analysis

Risk can be defined as the potential for loss of or damage to an asset (FEMA, Emergency Management Institute, 2023). This section analyzes the potential for loss or damage in the state of North Dakota.

4.3.3.1 National Risk Index

The National Risk Index leverages available source data for natural hazard and community risk factors to develop a baseline risk measurement for each U.S. County and Census tract. The risk equation behind the Risk Index includes three components: a natural hazards component (Expected Annual Loss), a consequence enhancing component (Social Vulnerability), and a consequence reduction component (Community Resilience). The dataset supporting the natural hazards component provides estimates measured in 2022 U.S. dollars. The datasets supporting the consequence enhancing and consequence reduction component have been standardized using a minimum-maximum normalization approach prior to being incorporated into the National Risk Index risk calculation. Using these three components, composite Risk Index values and hazard type Risk Index values are calculated for each community (County and Census tract) included in the Index. Risk Index values form an absolute basis for measuring Risk within the National Risk Index, and they are used to generate Risk Index percentiles and ratings across communities. Categories of risk are determined by using quintiles to determine categories, where 0-19.99 are low risk, etc. Risk scores are relative to other counties nationally. **Figure 4.3-31** summarizes the Nation Risk Index Drought Data by County for North Dakota. **Figure 4.3-32** shows the National Risk Index scores for drought.

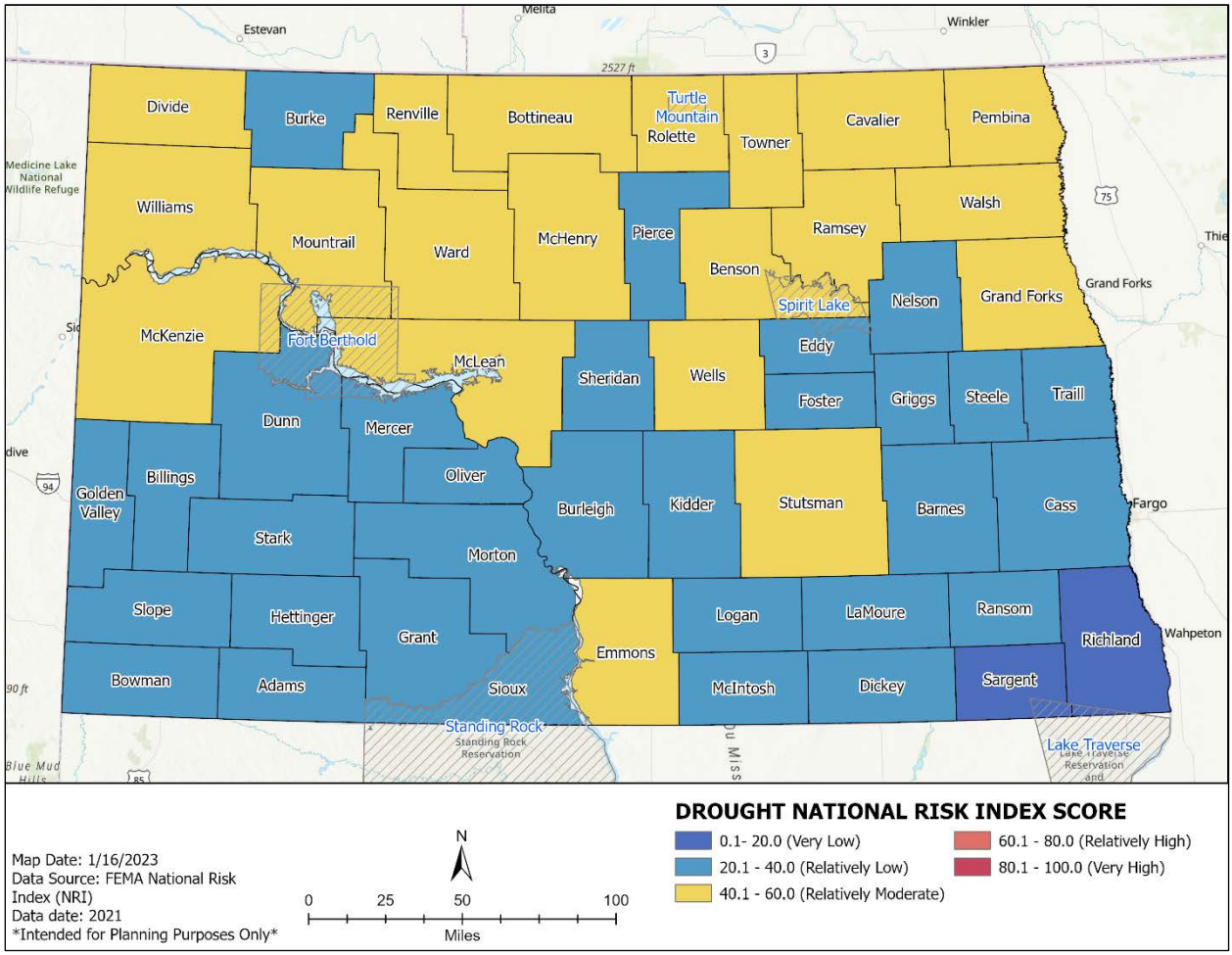
Figure 4.3-31: NRI Community Information and Summary Rating for Drought by County for North Dakota

County	Population (2020)	Impact Area (Sq. Mi.)	Agricultural Value	Community Resilience Rating	Social Vulnerability Rating
Adams	2,189	998	$ 69,309,056.00	Relatively Low	Relatively Low
Barnes	10,821	1,528	$ 319,610,933.00	Very High	Very Low
Benson	5,945	1,453	$ 188,431,961.00	Very Low	Very High
Billings	945	1,164	$ 32,988,738.00	Relatively High	Very Low
Bottineau	6,379	1,714	$ 247,113,536.00	Relatively High	Very Low
Bowman	2,993	1,178	$ 85,021,296.00	Relatively High	Very Low
Burke	2,201	1,140	$ 82,027,349.00	Relatively Moderate	Very Low
Burleigh	98,437	1,685	$ 153,885,294.00	Very High	Relatively Low
Cass	184,441	1,785	$ 504,152,767.00	Very High	Relatively Low
Cavalier	3,703	1,525	$ 321,827,285.00	Relatively Moderate	Very Low
Dickey	4,995	1,153	$ 258,203,636.00	Relatively High	Very Low
Divide	2,195	1,307	$ 81,950,329.00	Relatively Low	Very Low
Dunn	4,088	2,103	$ 88,958,740.00	Relatively Low	Relatively Low
Eddy	2,347	650	$ 94,355,628.00	Relatively Moderate	Relatively Moderate
Emmons	3,301	1,571	$ 185,874,747.00	Relatively High	Very Low
Foster	3,391	653	$ 136,153,096.00	Very High	Very Low
Golden Valley	1,732	1,012	$ 51,827,128.00	Relatively Moderate	Very Low
Grand Forks	73,042	1,453	$ 365,247,663.00	Very High	Relatively Low

County	Population (2020)	Impact Area (Sq. Mi.)	Agricultural Value	Community Resilience Rating	Social Vulnerability Rating
Grant	2,299	1,682	$ 95,178,205.00	Relatively Low	Very Low
Griggs	2,300	723	$ 131,461,522.00	Very High	Very Low
Hettinger	2,487	1,145	$ 76,386,809.00	Relatively Low	Very Low
Kidder	2,383	1,447	$ 130,331,407.00	Relatively Low	Very Low
LaMoure	4,083	1,162	$ 259,271,924.00	Relatively High	Very Low
Logan	1,876	1,021	$ 178,208,997.00	Relatively High	Very Low
McHenry	5,344	1,930	$ 167,836,023.00	Relatively Moderate	Very Low
McIntosh	2,530	1,004	$ 108,674,201.00	Relatively Moderate	Very Low
McKenzie	14,685	2,889	$ 120,109,111.00	Relatively High	Relatively Moderate
McLean	9,755	2,351	$ 202,827,135.00	Very High	Very Low
Mercer	8,350	1,123	$ 65,580,454.00	Very High	Relatively Low
Morton	33,242	1,964	$ 167,490,373.00	Very High	Very Low
Mountrail	9,797	1,961	$ 155,641,737.00	Relatively Low	Relatively High
Nelson	3,007	1,019	$ 138,674,631.00	Relatively Moderate	Very Low
Oliver	1,874	738	$ 54,282,128.00	Very High	Relatively Low
Pembina	6,825	1,132	$ 324,257,111.00	Relatively Moderate	Very Low
Pierce	3,976	1,093	$ 113,344,466.00	Relatively High	Relatively Low
Ramsey	11,577	1,314	$ 218,076,128.00	Very High	Relatively Moderate
Ransom	5,692	872	$ 199,143,670.00	Very High	Very Low
Renville	2,282	901	$ 143,881,466.00	Relatively High	Very Low
Richland	16,521	1,459	$ 448,145,499.00	Relatively High	Relatively Low
Rolette	12,180	948	$ 104,963,094.00	Very Low	Very High
Sargent	3,851	875	$ 245,697,870.00	Relatively High	Very Low
Sheridan	1,265	1,015	$ 105,603,335.00	Relatively Moderate	Very Low
Sioux	3,885	1,139	$ 70,998,357.00	Very Low	Very High
Slope	699	1,231	$ 54,986,300.00	Very Low	Very Low
Stark	33,613	1,353	$ 78,489,037.00	Relatively High	Relatively Low
Steele	1,798	722	$ 171,907,400.00	Relatively High	Very Low
Stutsman	21,575	2,321	$ 384,898,621.00	Very High	Relatively Low
Towner	2,161	1,052	$ 190,509,194.00	Relatively Low	Very Low
Traill	7,997	871	$ 259,114,697.00	Very High	Very Low
Walsh	10,553	1,307	$ 384,895,205.00	Relatively Moderate	Relatively Low
Ward	69,879	2,076	$ 236,220,211.00	Very High	Relatively Low
Wells	3,976	1,303	$ 238,870,905.00	Very High	Very Low
Williams	40,917	2,169	$ 151,255,240.00	Relatively High	Relatively Moderate

Source: NRI, 2023

Figure 4.3-32: National Risk Index Scores for Drought



Source: NRI, 2023

Generally, northern counties, which are considered relatively moderate, have higher National Risk Index scores as compared to the rest of the state, but nowhere in the state has a high score when compared to other counties in the nation.

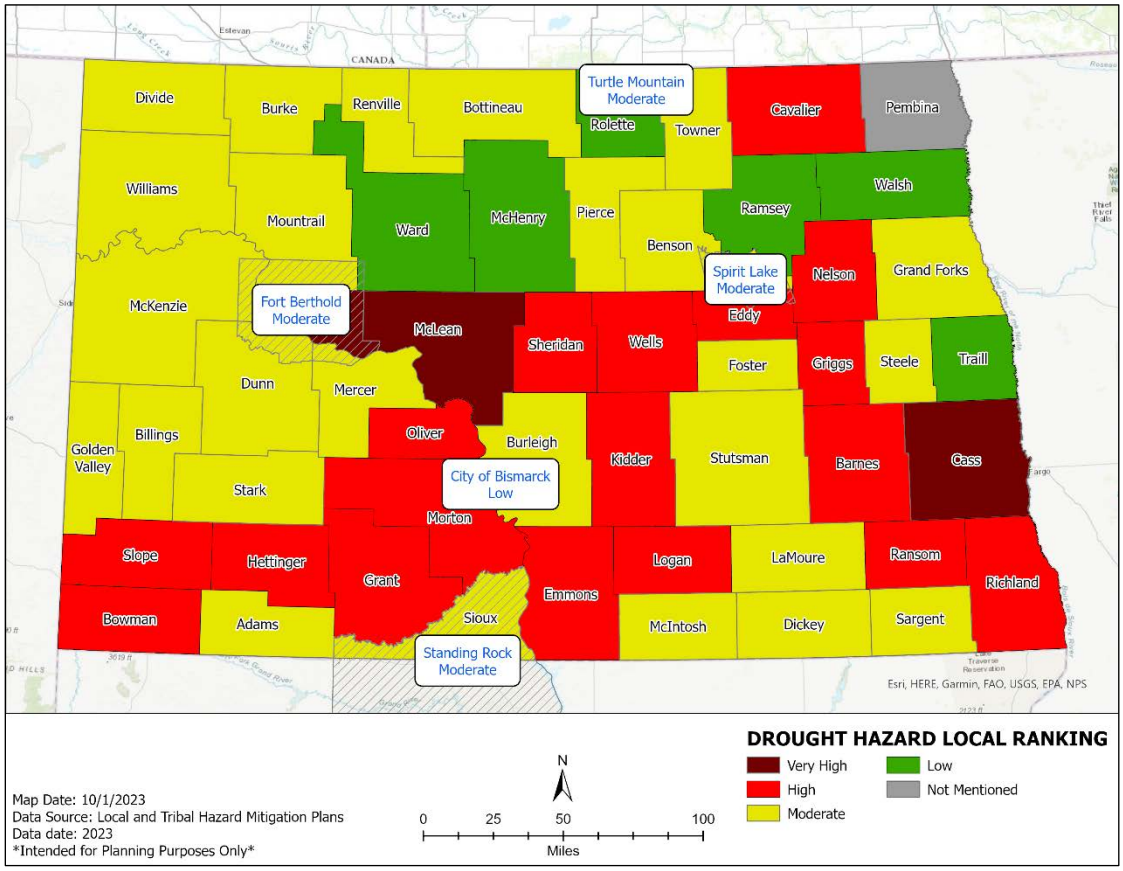
4.3.3.2 Risk Index Score

The Priority Risk Index for this plan update ranks drought as a high risk with a score of 3.4. Drought is ranked third (tied with Cyber Attacks) out of 15 total hazards.

4.3.3.3 Jurisdictions At Risk

Local jurisdictions also identify and assign hazards as low, moderate, high, or very high regarding priority for the community. Of the 58 local hazard mitigation plans, most counties rank drought as a moderate priority. Drought is not cited as a hazard in one county, however, with that county being Pembina. **Figure 4.3-33a** displays how local counties across the state ranked drought and **Figure 4.3-33b** compares how counties and tribes ranked the drought hazard.

Figure 4.3-33a: Local Mitigation Plan Drought Risk Prioritization Map



Source: Local and Tribal Hazard Mitigation Plans, 2023

Figure 4.3-33b: Local Mitigation Plan Drought Risk Prioritization

Local Mitigation Plan Drought Risk Prioritization	Number of Community Plans
Low	7
Moderate	30
High	18
Very High	2
Not Mentioned	1
Total	58

Source: Local and Tribal Mitigation Plans, 2023

4.3.4 Summary / Conclusion

Drought conditions negatively affect agribusiness, water supplies, human productivity and health, the environment, and many other aspects of society. While the impacts vary depending on the type, location, intensity, and duration of the drought, the spatial extent across multiple metrics is statewide. In conclusion, drought in North Dakota:

Figure 4.3-13: Field of Corn in Drought

Source: NDSU, 2023

- Has historically occurred frequently, and in both short and extended durations.
- Threatens two of North Dakota's most precious natural resources, wetlands, and the western prairie fringed orchid.
- Challenges the men and women working in the line of duty as first responders and the numerous professional industries that earn a livelihood exposed to the elements by exposing the workforce to more stressful and demanding conditions.
- Threatens multiple economic sectors, but agricultural and livestock commodities are the most vulnerable industries.
- Is recognized by all but one county as a hazard at the local county level and is ranked as the third greatest concerning hazard for the State of North Dakota per the latest updated Priority Risk Index.
- Is expected to increase in frequency and severity.

4.3.5 Data Limitations

There are many definitions and types of droughts. Additionally, there are multiple indices used to measure drought and specific data points collected under each index. Drought research customarily uses statistics collected over a reference period to establish a threshold for declaring a region to be in a drought, or to estimate baseline return periods. The length of the reference period is dictated by the available record length; often it is no longer than 50 to 100 years. Academically, it is being questioned whether this range reflects a duration sufficient to produce valid, useful results applicable to rapidly changing current conditions.

All data in the drought hazard profile was supplied from a variety of state, local, and federal sources. Private and municipal data was not included or sought for this state-level plan and may provide additional, supplemental insight had it been included.

4.4 Cyberattack

4.4.1 Overview

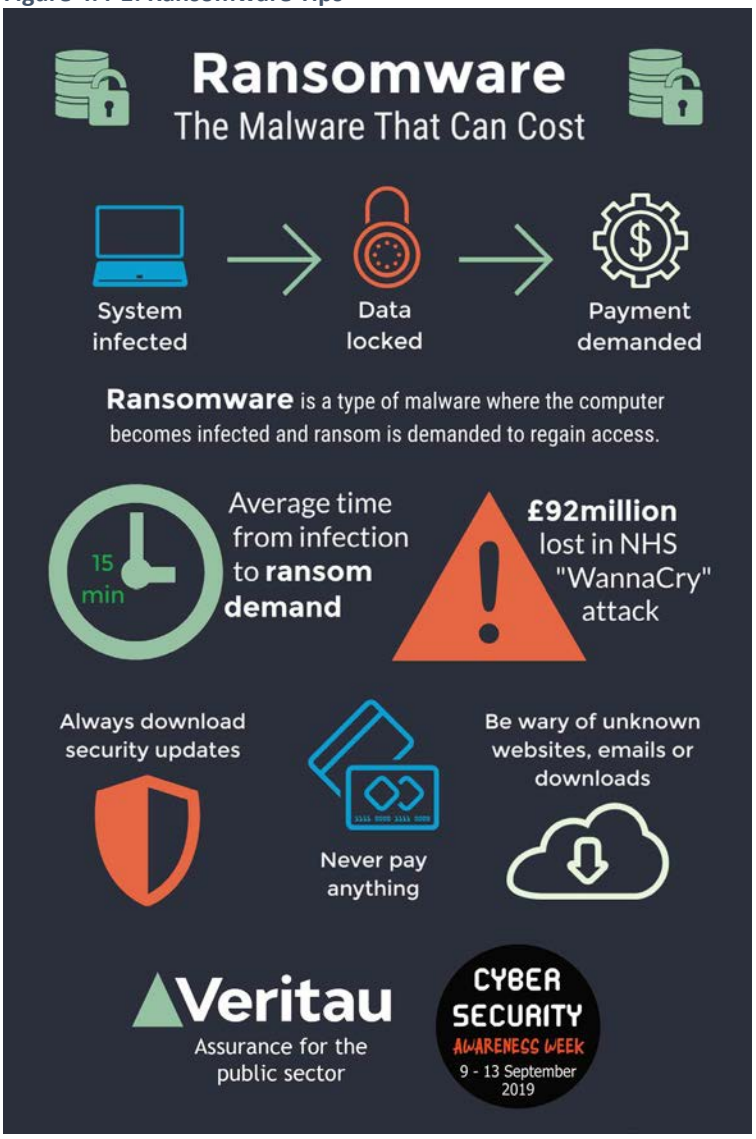
This section examines the risks posed by cyberattacks that warrant the state to assist in recovering from an incident statewide or locally. Cyberattacks can be orchestrated with the goal of policy change, criminal attack, or terrorism, which are covered in other sections. For a full evaluation of the risk of cyberattack consult the other adversarial threat sections, 4.13 and 4.15, which discuss linked hazards. This section focuses on cyberattacks as a method of attack.

4.4.1.1 Description

The National Institute of Standards and Technology (NIST) defines a cyberattack as any kind of malicious activity that attempts to collect, disrupt, deny, degrade, or destroy information system resources or the information itself (NIST, 2023). According to the ND State and Local Intelligence Center (NDSLIC), cybercriminals may take advantage of inclement weather periods and other socio-economic stressors to mask or otherwise facilitate their attacks in similar fashion to other types of criminal attacks (NDSLIC, 2023). However, such efforts would be more indirect than most criminal attacks with cybercriminals remotely targeting vulnerabilities as they are able, regardless of weather or climate concerns.

The Department of Homeland Security 's Cybersecurity and Infrastructure Security Agency (CISA) is one of the many federal government agencies focused on cyberattacks. CISA defines cyberattacks as actions by sophisticated actors or nation-states

Figure 4.4-1: Ransomware Tips



Source: Veritau, 2019

to exploit vulnerabilities to steal information and money by deploying the capability to disrupt, destroy or threaten the delivery of essential services. These attacks can be directed to state agencies, critical infrastructure operators, or private businesses or individuals (CISA, 2023). CISA's role is focused on these main types of cyber threats, and promoting cyber secure practices:

- **Malware, Phishing, and Ransomware:** These are common methods of attacks that can be directed at individuals or organizations. Malware is "any software used to gain unauthorized access to IT systems in order to steal data, disrupt system services or damage information technology (IT) networks in any way" (CISA, 2023). Ransomware is malware that holds systems or data captive for payment. Phishing is an online scam enticing users to share private information through deceitful or misleading tactics.
- **Incident Detection, Response and Prevention:** According to CISA (2023), cyberattacks are not always easy to detect and can take months to years in some cases to be discovered, and it is necessary to develop and deploy tools to identify attacks in a timely manner to mitigate the damage.
- **Advanced Persistent Threats:** An advanced persistent threat (APT) is a well-resourced adversary engaged in sophisticated malicious cyber activity that is targeted and aimed at prolonged network/system intrusion. APT objectives could include espionage, data theft, and network/system disruption or destruction.

Cyber security best practice methods may include, but are not limited to:

- **Information Sharing:** CISA coordinates with cyberattack victims to help disseminate information about vulnerabilities before attackers move on to other victims.
- **Securing Networks:** According to CISA (2023), protecting information systems from attacks takes resources related to monitoring, assessment and upgrading software and hardware to reduce vulnerabilities.

As technology evolves, artificial intelligence (AI) has come to citizens' and technology experts' forefront. Security challenges associated with AI parallel cybersecurity challenges associated with previous generations of software (CISA, 2023). These technologies may face cyber vulnerabilities as AI is used to build efficiencies for experts and adversaries. Federal, state, local, and tribal partners continue to watch as AI progresses and integrates into our everyday lives.

4.4.1.2 Previous Occurrences

The following section describes notable and recent events of cyberattacks in the state of North Dakota or that should be considered as a risk for the state based on its occurrence elsewhere.

- Between 2012 and 2019, Chinese hackers sought to infiltrate private contractors in the telecommunications, healthcare, semiconductor, and AI industries trying to seek a competitive edge. Chinese hackers and other companies have targeted military contractors (CSIS, 2023). Government contractors in the private sector provide targets for foreign hackers.

- In October 2014, Malware found on North Dakota State College of Science computers may have exposed personal information of up to 15,000 then-current and former students. A similar breach occurred at North Dakota University System earlier that year, exposing information about 290,000 then-current and former students and 780 faculty and staff. The cases were not linked and used different methods to access the information (Forum News, 2014).

Figure 4.4-2: CyberMadness High School Competition

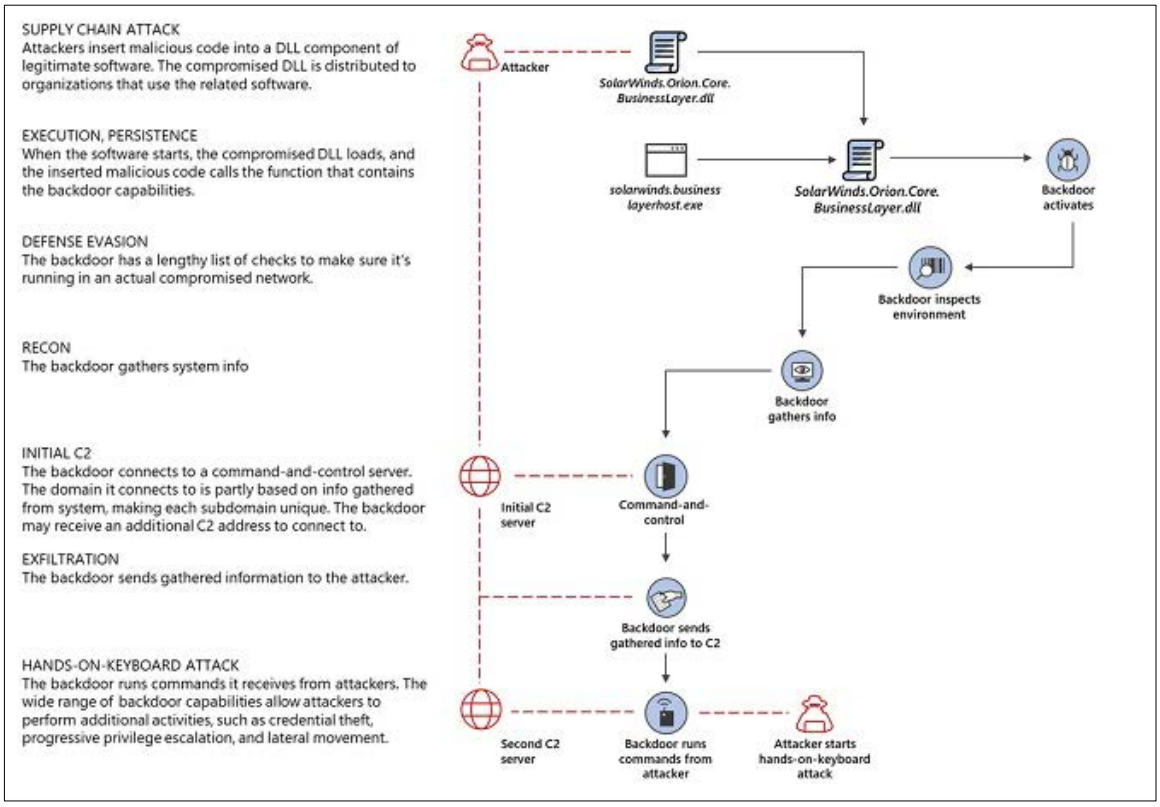
Source: North Dakota EduTech, 2023

- In 2016 the first major ransomware attack on a healthcare system was identified – the MedStar Health and Hospital system had 10 hospitals and 250 outpatient centers, one of which was in Minot and was among the first healthcare facilities in North Dakota to experience a cyberattack. The healthcare system lost access to patient files and their hospitals and outpatient centers had to temporarily shut down.
- In September 2016, the North Dakota Department of Mineral Resources was attacked by ransomware. The malicious software caused files to become encrypted. Once the ransomware attack was identified, the agency immediately shut down the servers, and the department was able to restore their files from files stored at an off-site location.
- In June 2017, a cyberattack from Europe impacted a North Dakota hospital. According to KXNews (2017), a company that provides services to Trinity hospitals around the country identified the attack and told Trinity Health in Minot to shut down their network systems and revert to paper charting while the system was remediated.
- In February 2018, there were malware attacks on one-third of North Dakota's schools. It took 45 days to completely clean the school system's network (Howard, 2018).
- A Microsoft Exchange attack launched by the Chinese Hafnium hacker group that accessed email servers in cities, counties, and school districts in the state in March 2021. According to Turley (2021), NDIT worked with the affected agencies to assess the damage and recover any damage.

- In 2019 and 2020, there was a supply chain breach that involved the SolarWinds Orion system (commonly referred to as the Sunburst hack). During this event, suspected nation-state hackers gained access to the networks, systems, and data of thousands of SolarWinds customers (Microsoft Threat Intelligence, 2020). The breadth of the hack is unprecedented and one of the largest, if not the largest, of its kind ever recorded. More than 30,000 public and private organizations - including local, state, and federal agencies -use the Orion network management system to manage their IT resources. As a result, the hack compromised the data, networks, and systems of thousands when SolarWinds inadvertently delivered the backdoor malware as an update to Orion software.

> On August 13, 2020, a state of North Dakota employee's email was compromised resulting in password changes to several Stutsman County employee email accounts.
>
> *(Stutsman County Multi-Jurisdictional Hazard Mitigation Plan, 2021)*

Figure 4.4-3: Structure of Sunburst Attack



Source: Microsoft Threat Intelligence, 2020

- In May 2020, the state's largest fiberoptic network, Dakota Carrier Network (DCN), was hit with a ransomware attack launched by the Maze cybercriminal outfit (Martin, 2020). Among DCN's clients are the state government and 400 other public entities. The data being held for ransom was determined not to be critical to protecting customers; the company refused the ransom request.
- On April 28, 2021, the Three Affiliated Tribes—the Mandan, Hidatsa & Arikara Nation—announced that they had been the victim of a ransomware attack that, according to Thompson

(2021), cut off the tribe's access to files, email, and other critical information. This caused tribal government delays and slowed government.

- In May 2021, Perret (2021) reports the agriculture sector experienced impacts when JBS Foods USA suspended operations at 10 plants due to a cyberattack.
- In August 2021, an attack on one of the vendors for Sanford Health (DMS Health Technologies) was ultimately unsuccessful. In this data breach, patient names, dates of birth (DOBs), and dates of service for roughly 21,000 people were obtained. According to the Fargo Forum (2021), with 46 hospitals, primarily in the Dakota region, a successful attack may have had significant impacts to the state's ability to deliver healthcare service.
- In November 2021, a fake purchase order successfully launched a cyberattack on the Turtle Mountain Band of Chippewa's finance department. According to Skurzewski (2021), damage was limited to the finance department.
- In April 2022, North Dakota's Adaptive Health Integrations, which provides billing software for the medical industry, acknowledged a data breach from a cyberattack. Data of up to 510,574 people may have been accessed in the attack, including Social Security numbers (Monk, 2022).
- On June 28, 2022, a North Dakota Workforce Safety and Insurance Agency opened a phishing attack email that contained malicious code allowing access to personal information on 182 state employees. The attack was sophisticated enough that the agency could not be certain what data may have been obtained (NDWSI, 2022). To protect the victims, the state purchased 12 months of identity protection services for those exposed.
- In October 2022, CommonSpirit Health, the fourth-largest health system in the nation, had to reschedule surgeries and appointments due to a ransomware attack. St. Alexius Health was among the CommonSpirit hospitals hit in the attack. It took five days to restore regular business. Ambulances and life-sustaining surgeries were not impacted in Bismarck (Dalrymple, 2022). According to Collier (2022), at least 15 different health systems were breached in 2022, representing 61 hospitals.

Figure 4.4-4: St. Alexius in Bismarck was hit with a Cyberattack.

Source: Bismarck Chamber of Commerce

- Also underscoring the vulnerability of healthcare systems, an August 3, 2023, successful ransomware cyberattacks disrupted operations for Prospect Medical Holdings hospitals and clinics in Connecticut, forcing emergency services crews to divert patients to other hospitals. As the healthcare facilities moved to paper systems and limited admissions, elective surgeries, outpatient appointments, blood drives and other services were suspended for two days, and emergency rooms were shuttered for most of a day (Eaton-Robb, 2023). Attacks on healthcare facilities and networks have become more common since the last plan update.

4.4.1.3 Location and Extent

Any computer connected to the internet has the possibility of being targeted by a cyberattack, including home computers. Any technological device that relies on the internet may also be a target. While certain industries, healthcare, government, and oil and gas, may be targeted more frequently and by more sophisticated actors, cyberattacks can occur anywhere in the state. **Figure 4.4-5** shows an overview of the spatial extent for cyberattacks in the state.

Figure 4.4-5: Spatial Extent for Cyberattack

Resource	Extent
Public	Statewide
First Responders	Statewide
Delivery of Service and Continuity of Operations	Statewide
Property, Facilities, and Infrastructure	Statewide
Environment	Statewide
State Economy	Statewide
Public Confidence in the State's Governance	Statewide

4.4.1.4 Probability

The probability of a cyberattack in the state is increasing over time. Worldwide, ransomware attacks are launched every 11 seconds as of 2021, and that interval is expected to shorten to every two seconds by 2031. The United States is the preferred target of cybercriminals, receiving 46 percent of all attacks in 2021 (Brooks, 2022). It is highly probable that the state will be impacted by a cyberattack.

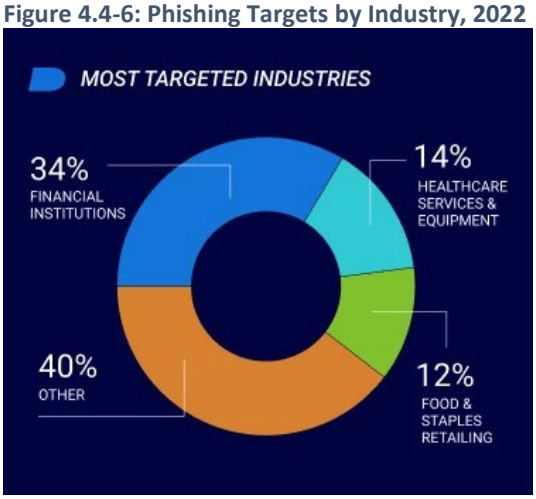
There is every reason to believe that the number of cyberattacks will rise. Between 2018 and 2019, attempted cyberattacks in state government overall tripled to more than 15 million attempts per month in 2019, up from 5 million attempts per month in 2018 (Moreno, 2020). According to Perret (2021), Federal Bureau of Investigation (FBI) reports of cybercrime increased 260% between 2019 and 2020. Cybercrime is estimated to cost businesses $10.5 trillion globally by 2025 (Cloudwards, 2023).

The severity of attacks is likely to become more consequential as well. Since 2020, the profile of the attacks has raised from local institutions to areas of national importance, such as the food system via JBS, the energy sector via pipelines, and national security via the Sunburst attack on the United States Department of Energy. These attacks are also becoming more sophisticated. Past ransomware attacks could be thwarted with offline backups, but today's attacks include a download of data prior to notification and threats to release the data on the dark web. According to Perret (2021), having a backup will not protect data in this circumstance.

Phishing attempts are currently the most common form of cyberattacks. In 2021, about 324,000 people fell for phishing attacks. Each attack cost the victim about $136 for a total exceeding $44.2 billion

worldwide in one year. This attack method is used in about 65 percent of all known cybercriminal groups. Most phishing attacks are seeking information to be used for fraud at a later date. In the United States, this method saw a 48 percent increase from 2021 to 2022. There are an estimated 3.4 billion spam emails sent out each day across the world, as of 2022, comprising 48 percent of all emails sent in that year. Almost three percent of every 100,000 North Dakota residents fell prey to phishing attempts in 2022 (Forbes, 2023). Financial institutions are the most targeted industries since data obtained about bank accounts and credit cards can be quickly and easily exploited (Blackberry, 2022). In 2022, North Dakota ranked 21St among U.S. states for the highest financial losses to phishing attacks. According to Elad (2023), North Dakotans lost $24,010 per 100,000 residents in that year.

Figure 4.4-6: Phishing Targets by Industry, 2022



Source: Blackberry, 2022

Ransomware is increasing in its demands and in its variety of deployments in recent years. Ransomware encrypts or locks data making it inaccessible to anyone other than the hacker and requires payment for the return or de-encryption of what has been hijacked. From 2020 to 2021, ransomware demands increased by 43 percent to an average of $220,298 per attack. High profile attacks, such as the JBS attacks have spurred retribution attacks that have served as a significant deterrent for using ransomware on high-value targets. Additionally, the FBI has become more successful in retrieving ransomware payments, leaving hackers focused on smaller businesses (Kochovski, 2023). In 2021, 37 percent of all businesses and organizations were hit by ransomware. According to Brooks (2022), payouts of $5.2 billion in Bitcoin was reported in ransomware payments alone in 2021.

The costs of data breaches increased from $3.86 million in 2020 to $4.24 million in 2021. Distributed Denial of Service (DDOS) attacks, which are ultimately intended to force a business or company offline, increased by 1.6 million between 2020 and 2021. According to Brooks (2022), Internet of Things (loT) attacks, attempts to gain control of any internet connected device, are seen as the attack with the most expectation of growth. According to Cybersecurity Ventures, the cost of cybercrime is predicted to hit $8 trillion in 2023 and will grow to $10.5 trillion by 2025 (Brooks, 2023). The probability and potential impact of cybercrimes continue to expand as dependencies on technology continue.

4.4.1.5 Warning Time and Duration

Part of the difficulty in determining the damage done by cyberattacks is that malware or data breaches can go undetected for quite some time. According to Brooks (2022) and CSIS (2023), hackers can be in a system for years before the attack is known, and it can be difficult to determine what data was accessed or what networks were penetrated once an attack has been detected.

4.4.2 Consequence and Vulnerability Loss Analysis

This section describes the consequences and vulnerabilities of cyberattacks. Both consequences and vulnerability will be discussed in this section.

A consequence is the "degree of debilitating impact that would be caused by the incapacity or destruction of critical infrastructure or a critical function" (FEMA EMI, 2023). Consequences can be tangible impacts to buildings or systems or intangible impacts on processes, business, or reputation. Consequences include the debilitating impacts, such as the loss of critical functions, data, or the public. It also includes cascading effects that may influence functionality of critical services such as the loss of service of a utility or communications.

Vulnerability is "susceptibility to physical injury, harm, damage, or economic loss" (FEMA EMI, 2023). It considers the extent of injury and damage that may result from a hazard event of a given intensity in each area. This may be a geographic, social, or economic feature that makes harm from a hazard more likely or more intense.

4.4.2.1 Human Loss

Since 2018, the FBI Internet Crime Complaint Center has received 652,000 complaints per year with a steady increase of incidents (CISA, 2022). The majority of crimes were categorized as phishing, with non-payment/non-delivery following in incidents then followed by extortion, personal data breach, and technology support. Comparatively, North Dakota has the largest average loss of any state with losses of $37,711 per scam (Radauskas, 2023). With the aging population, citizens ages 60+ have proven to be the most targeted age group for cybercrime. Cybercrimes can lead to distrust and financial or data loss.

While human loss and injury are not the first consequences that a person might associate with cyberattacks, there have been deaths directly tied to cyberattacks on hospitals across the globe. Even in North Dakota, when CHI St. Alexius Health Bismarck Medical Center and Trinity Hospital in Minot were attacked, hospitals had to reschedule elective surgeries and cancel appointments with doctors, likely prolonging suffering for some people.

Figure 4.4-7: Sanford Health West in Dickinson

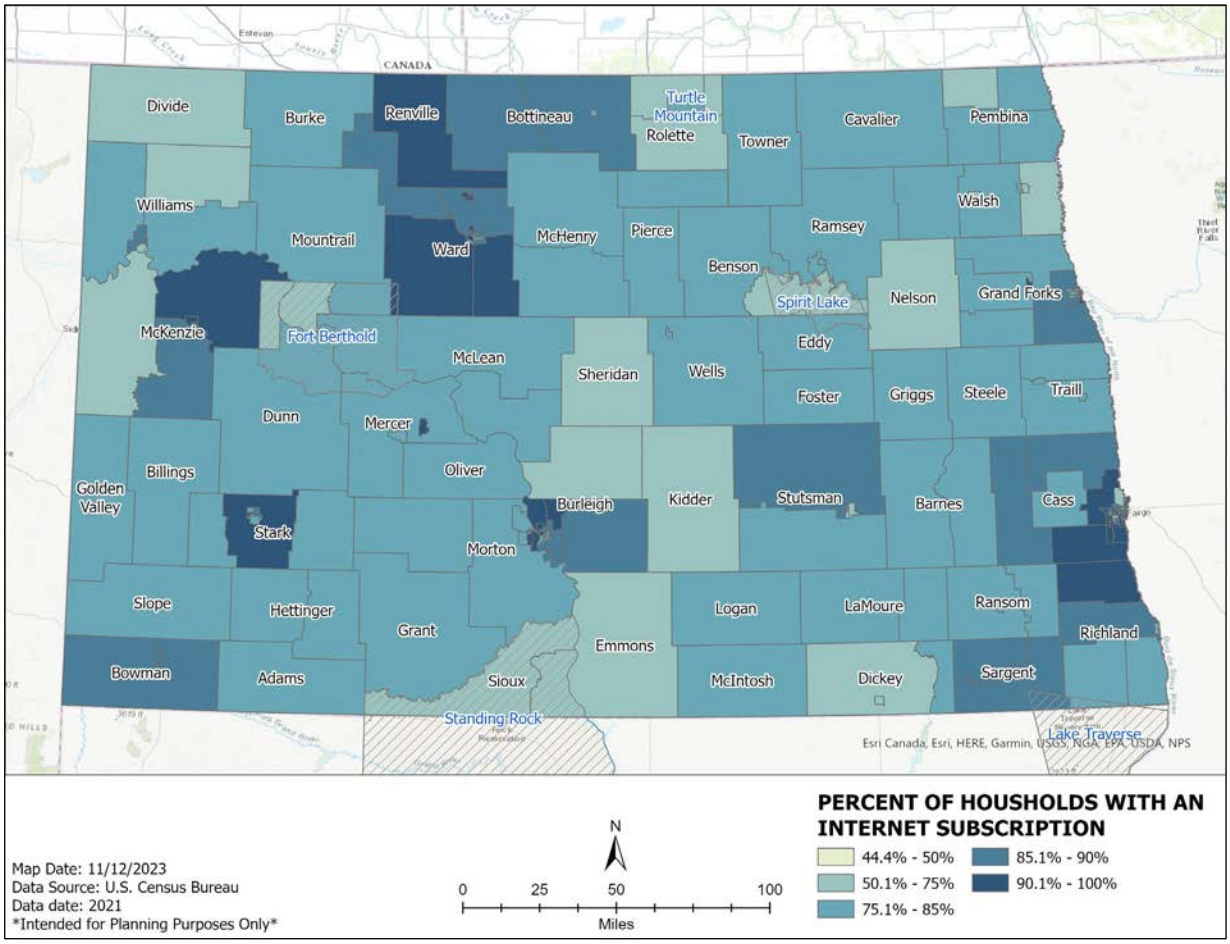
Source: Sanford Health, 2014

With Sanford Health's robust footprint in the region, a successful attack on its healthcare network could lead to significant human suffering and loss (Springer, 2021). Past

cyberattacks have resulted in the re-directing of ambulances, and the number of rural hospitals run by Sanford in the region presents a unique vulnerability. There would be limited alternatives within a reasonable distance. The impacts on patient care would likely create significant problems, especially if occurring at the same time as another emergency in the region. Several of the Sanford hospitals are along I-94, so a crippling cyberattack during a significant event on that interstate could prove costly to human life.

For most hazards, internet access for individual households is seen as a positive, with full access to the internet for all residents as a goal, but for cyberattacks, each connection to the internet is an opportunity for an attack to enter networks. **Figure 4.4-8** shows the percent of households with internet in each census tract (American Community Survey, 2021). While many urban areas have high rates of internet services, there are rural areas of the state where Internet access is less than 50 percent. Access to broadband has been a focus for individuals and now the state of North Dakota.

Figure 4.4-8: Percent of Households with an Internet Subscription



Source: U.S. Census Bureau, 2021

4.4.2.2 First Responders

An attack on a hospital may increase the distance an ambulance must transport a patient, requiring extended care in the vehicle. While there is no more specifically unique consequence or vulnerability for

first responders, their data networks are also at risk for a cyberattack. Likewise, an attack on fire departments, police departments, and emergency medical services would increase response times and hinder the ability to provide emergency services. Prolonged attacks with outages may cause catastrophic cascading impacts to emergency services.

4.4.2.3 Environmental, Natural, and Cultural Resources

The environment, natural, and cultural resources are one of the few things not dependent on the internet for normal operations. However, accessing many of these resources do rely on websites, ticketing operations and apps, which may be hacked. Resources like the North Dakota Parks and Recreation reservation website, hunting and fishing licenses for sportsmen, and websites for cultural institutions may all be impacted by cyberattacks, impacting North Dakotans' ability to enjoy these resources.

4.4.2.4 Property, Facilities, and Infrastructure Damage

Figure 4.4-9: Oldsmar Florida's water treatment facility was attacked.

Source: Griffin, 2021

While physical damage to property is unlikely a consequence of cyberattacks, financial impact from ransomware attacks and downtime and recovery from a cyberattack can be damaging to the owners of properties, leading to abandonment from business closure. Facilities, such as pipelines, water treatment facilities, and military facilities, and infrastructure may be more at risk for harm as of these critical facilities utilize older and unsupported technologies. Past cyberattacks and attempts have targeted pipelines, military subcontractors, electrical utilities, and water suppliers.

The national importance of these targets and the likelihood of their loss of service creating panic or causing human harm makes them a high-quality, and sometimes easily accessed, target. Recent acts of retribution for these high-consequence necessities from the federal government have served somewhat as a deterrence. The Oldsmar Florida cyberattack was an attempt to increase the level of lye in the city's water system to a potentially lethal proportion. The attack was only thwarted because an employee was watching the system while the hacker took control and was able to take action to reverse the move. According to Griffin (2021), the hack was viewed by the cybersecurity industry as an amateur attack that may have been successful if carried out by a more experienced outfit, which would have concealed the

action to the human monitor. While this did not happen in North Dakota, an incident alike this could be emulated within the state.

Smaller companies, rural cooperatives, or municipal infrastructure may be more vulnerable because they are seen by hackers as an easier target due to the likelihood of having smaller, less sophisticated IT departments and cybersecurity protections. Similarly, private contractors are seen as an appealing back door into American military assets.

4.4.2.5 Critical Facilities, Community Lifelines, and State Assets

There are many sectors of critical infrastructure that are vulnerable to cyberattack. Within the state, private critical infrastructure (i.e., water treatment facilities) may have many vulnerabilities that are outside of state jurisdiction. The North Dakota Homeland Security Advisor retains a priority list of critical infrastructure sectors.

Cyber security related to healthcare is highly important and a priority. In healthcare, 70 percent of polled hospitals indicated that cyberattacks had resulted in longer hospital stays and/or procedure delays which can ultimately lead to increased mortality (Brooks, 2022). Healthcare facilities have reported an increase in attacks since 2019, with 51 percent reporting an increase that has resulted in 65 percent of facilities affected diverting patients, and 70 percent of those affected reporting longer hospital stays, procedure delays, and/or increased mortality due to cyberattacks. According to the Herjavec Group (2022), in 2020, 560 healthcare facilities were impacted by ransomware in 80 distinct incidents. In that year, the average cost of a healthcare ransomware attack was $4.24 million.

Half of all internet-connected devices in hospitals are seen as vulnerable to hackers, meaning that the consequences of healthcare hacks may be increasing (Brooks, 2022). Online monitors and medical devices manufactured by outside private companies provide new access to networks (Newman, 2017). In addition to the human health impacts, such delays in care, alterations in protocol, and release of sensitive medical information can be costly to healthcare networks, due to legal liability and Health Insurance Portability and Accountability Act (HIPAA) violation fees. The ransomware attack on the MedStar Health and Hospital system resulted in the temporary closure of outpatient centers in North Dakota (McCarthy, 2016).

Figure 4.4-10: Medical Devices can be origins for cyberattacks.

Source: Newman, 2017

According to Trienen (2021), in April 2021, the Alaska state courts were forced offline from a cyberattack, which made court filings, court record searches and the payment and fine system unable to

be accessed by the public for several days, demonstrating the possible risk to state assets from a state-level cyberattack. While some incidents listed in this threat profile did not take place within the State of North Dakota, this is one example of how state government can be impacted by cyberattacks.

4.4.2.6 State Economy and Economic Disruption

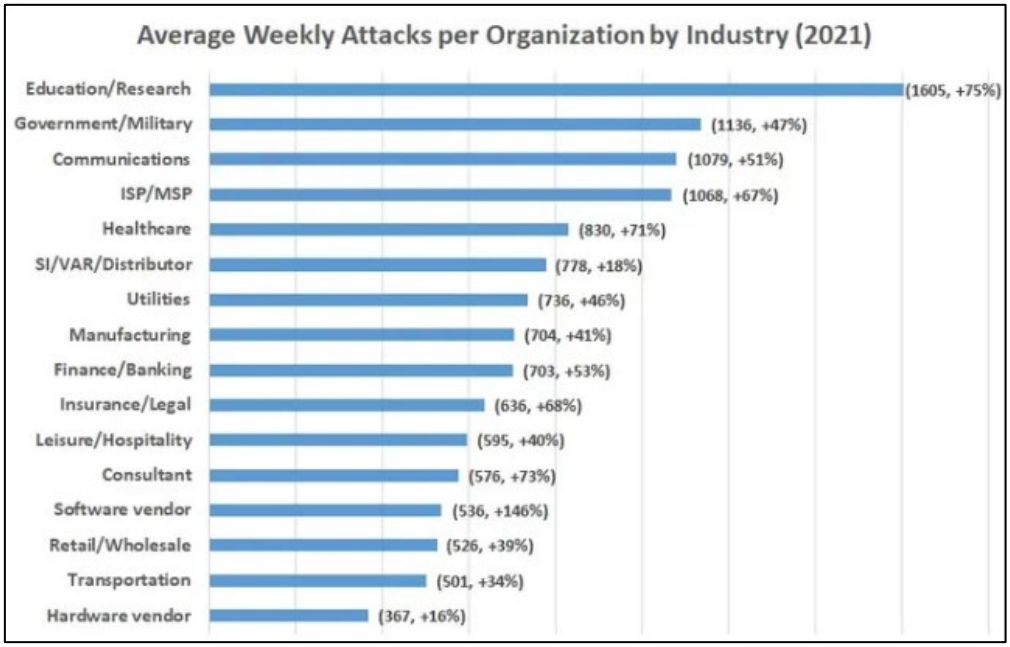
Businesses listed cyberattacks as the top risk for businesses in the 2022 Allianz Risk Barometer, which is an annual report identifying the top corporate risks for the following year. It topped business interruption, natural hazards, pandemic, and climate change (Allianz Risk Barometer, 2022). Up to 93 percent of private company networks were thought to be penetrable to cybercriminals (Brooks, 2022). Attacks on corporate businesses are up 50 percent from 2020 to 2021 (Zurier, 2022). Small businesses with small IT departments can be an easy target for hackers. In total, 43 percent of all data breaches involved small businesses in 2021. Attacks led to an average of 8 hours of downtime per attack. Phishing attacks (57 percent) were the most prevalent to polled businesses, with compromised or stolen devices (33 percent) and credential theft (30 percent) just behind. More troubling, 83 percent of small businesses said they are not financially prepared to fund recovery from a major cyberattack (Brooks, 2022). According to McLean (2023), just 14 percent of small businesses say they are prepared to defend themselves against cyberattacks.

During the Dakota Access Pipeline (DAPL) protest, personal information of law enforcement officers who assisted in response to the protest was released with the intent to harass and/or intimidate them and their families. Doxing was the type of cyberattack used.

(Morton County Multi-Jurisdictional Hazard Mitigation Plan, 2020)

Industry attacks are more prevalent since the last plan update and reach a broader sector of the economy. **Figure 4.4-11** shows the breakdown of attacks by industry. Education and research are first,

Figure 4.4-11: Attacks by Industry, 2021



Source: Brooks, 2022; Check Point Research Team, 2022

followed by government and military. The greatest increase in 2021 was in the software vendor industry, which could have far-reaching impacts beyond the company itself if software development is targeted, as was the case in the SolarWinds and the Adaptive Health Integrations attacks. According to Zurier (2022), education is seen as a top target because of its high-value research properties and the ease of the target due to the number of users in the system.

Even groups such as the North Dakota Soybean Growers Association have been targets for phishing attacks, with hackers spoofing their emails to attempt to get private information from farmers, causing the organization to warn members through its blog in May 2023 (North Dakota Soybean Growers Association, 2023). Attacks on farmers could hinder the use of global positioning systems (GPS) and computer-based farming equipment, impacting crop management and production.

4.4.2.7 Delivery of Services and Continuity of Operations

Government organizations were among the top targets for cybercriminals, and the range of services that can be disrupted is broad. Local services like libraries, utility payment systems, and other vendor services can greatly impact the lives of those who depend on them, while perhaps not getting the major headlines. NDIT and the North Dakota National Guard (NDNG) listed what they saw as their top cyber threats in 2023, and these are shown in **Figure 4.4-12**. While the state's top IT agency experienced phishing and malware among other threats, much of the National Guard's threats came from internal and external human sources (NDIT, NDNG, 2023). Both types of threats could result in the disruption of services or inability to respond to an additional threat.

Figure 4.4-12: Top Cyber Threats by Agency, 2023

North Dakota Dept. of Information Technology	North Dakota National Guard
Phishing Emails	Social Engineering
Supply-Chain Attacks	Third-Party Exposure
Unpatched Vulnerabilities	Configuration Mistakes
Malware	Poor Cyber Hygiene
Compromised Credentials	Insider Threats
Distributed Denial of Service (DDOS) Attacks	
Insider Threats	
Spoofing	

Source: NDIT, 2023; NDNG, 2023

Public access to unsecured Wi-Fi can act as a gateway for attackers. Libraries, schools, and community centers are also sites that contribute to state and local government vulnerability. These locations often provide internet access or computers to the public, increasing hacker access to state and local government systems. While many of the state's rural areas have some access to internet service, the Broadband Association of North Dakota identified unserved areas in a 2021 report. **Figure 4.4-13** shows the count of households or businesses by county and the amount it would cost to expand service into those areas.

Despite being home to the state's largest city, Cass County had the largest number of properties (1,615) without access to the internet. According to the Broadband Association of North Dakota (2021), Grand

Forks County, which includes the second-largest city, also had a sizeable broadband-free zone with 663 unserved points. Areas where there is significant population growth also have larger numbers of properties without broadband, including Mountrail (943) and Williams (562) counties. In total, 21 of the state's 53 counties had areas where residents need public access points to meet their need for internet access, which can include remote learning.

Figure 4.4-13: Access Points not Served by Broadband, 2021

COUNTY	UNSERVED LOCATIONS	ESTIMATED COST
Barnes	295	$ 4,277,500
Billings	292	$ 8,652,186
Burke	233	$ 1,593,697
Burleigh	15	$ 365,730
Cass	1,615	$10,993,000
Divide	44	$ 1,184,618
Dunn	291	$ 1,642,179
Grand Forks	663	$ 9,700,000
Grant	56	$ 1,512,000
McKenzie	74	$ 688,413
McLean	192	$ 1,083,846
Montrail	943	$ 5,320,982
Morton	31	$ 278,785
Ransom	37	$ 536,500
Richland	460	$ 980,000
Stark	140	$ 3,819,900
Sioux	44	$ 1,188,000
Steele	175	$ 2,783,500
Traill	942	$10,876,000
Walsh	256	$ 3,577,344
Williams	562	$ 7,239,000
TOTAL	7,360	$78,293,180

Source: Broadband Association of North Dakota, 2021

On November 20, 2023, the Broadband equity access and deployment (BEAD) initial proposals, and digital equity (DE) plan was announced. The goal of this plan is to provide access to reliable broadband internet (NDIT, 2023). Private and public partnerships between telephone and cable companies bring the state closer to the goal of 100 percent coverage than nearly any other state. Access to such resources provides an equitable learning space for students and adults on the internet and encourages communication among citizens.

The North Dakota Department of Public Instruction developed educational standards around computer science and cybersecurity and higher education programs on cybersecurity were expanded (Burgum, 2019). Educational training for teachers works toward assuring there is one cyber-trained teacher in each public school in the state (Riley, 2023). Anti-malware software has been installed on state computers, including Chromebooks in schools. The state has developed a free cybersecurity risk assessment tool available to all residents in the state at https://defend.nd.gov/ that also hosts cybersecurity educational materials and shares resources from other agencies (NDIT Cybersecurity, 2023). According to Careless (2023) recent efforts of NDIT include integrating AI technology to thwart phishing attacks, among other efficiencies. Education around cyber security increases resiliency exponentially, these efforts will continue to remain as a best practice throughout the state and country.

4.4.2.8 Public Confidence in the State's Governance

Studies indicate that the impact of cyberattacks on the human psyche is not categorically distinct from the impacts of regular attacks. It causes stress, anxiety, insecurity, and a preference for security over liberty. The impact of cyberattacks also causes people to re-evaluate their confidence in public institutions and support more forceful government regulation. In short, cyberattacks undermine the public's belief that the government is doing everything necessary to protect them from harm and are more willing to sacrifice liberty for security from cybercriminals (Gross, Canetti, and Vashdi, 2017). In fact, this undermining of confidence in government and the request for more aggressive intrusion of government activity in daily life may be the goal of the cybercriminal, especially those from state-sponsored hackers. Cyberattacks undermine public trust in democratic institutions and the belief that the government can protect them from harm. According to Shandler and Gomez (2022), it divides communities and decreases social cohesion as direct victims lobby for more security action that non-victims may find anti-democratic and intrusive.

According to Gross, Canetti, and Vashdi (2017), in lethal cyberattacks or cyberattacks on critical infrastructure, the public's confidence in government advice about their behavior falls significantly, indicating a clear vulnerability to the public's confidence when human consequences are involved.

Participants from the New Americans/Foreign Born/Immigrants (NFI) ND Health and Human Services Health Advisory board discussed hazards after a short presentation by NDDES during a Community Coffee. Members explained the challenges of fielding scam calls being an English as a second language speaker (Brighton, 2023). Callers may target vulnerable populations to access private documents or bank account information.

Many groups including NFI, persons with disabilities, oil, and gas workers, along with survey respondents ranked cyberattacks as one of the greatest threats to the state. With heightened dependencies on technology many citizens were concerned about communications and access to resources. Vulnerabilities continue to expand as the number of attacks increases, citizens shared personal defense methods such as backing up documents, regularly changing passwords, and keeping stockpiles of materials that may be needed in the case of power outage.

Another rising fear in cyberspace that can impact public confidence in government is the use of artificial intelligence to create "deep fakes" or recreations of real people and real voices, which can be used to generate fake quotes or spread falsehoods that appear to be coming from official sources, essentially counterfeiting reality (Congressional Research Service, 2019). The effect of such use of technology is identified as erosion of public trust, negative impacts to public discourse, impacts to elections, blackmailing public officials, and plausible deniability of genuine content (Congressional Research Service, 2019). In October 2023, the federal government issued an executive order on this technology, requiring companies to report risks from this technology that could aid terrorists, foreign nations, impact elections, or swindle consumers (Kang and Sanger, 2023). In response, according to BBC News (2023), Meta announced it would require political advertisers to identify if they have used this or other digital manipulation technology on Facebook, Instagram, Twitter, TikTok, or other modes of social media. Social media can magnify the spread of information from bad actors or international adversaries.

Actors may target already vulnerable populations including, but not limited to, the NFI (New American, Foreign Born, Immigrant) population, youth, elderly, disabled, and rural populations.

4.4.2.9 Estimation of Annual Losses

The FBI reported a loss of more than $4 billion in the United States in 2020 (Perrett, 2021). According to Brooks (2022) and McLean (2023), estimates indicate that the cost of cybercrime increases 10 percent to 15 percent each year.

In 2021, North Dakotans experienced the highest per capita losses to cybercrime in the nation, according to FBI data. North Dakota has the largest average loss of any state with losses of $37,711 per scam (Radauskas, 2023). While North Dakota topped the losses, it did not have the highest rate of victims in that year.

Internationally, ransomware alone cost $20 billion in 2021, a number that is projected to increase to $265 billion by 2031. Recovery alone cost one business $1.85 million in 2021 (Adams, 2021). According to Brooks (2022), only about 65 percent of ransomware targets get their data returned, and just 57 percent are able to restore data through the use of backups.

4.4.2.10 Community Resilience

The Biden Administration has been particularly aggressive in retribution for cyberattacks. Many of the more sophisticated actors are groups that have government approval from countries like Russia, China, North Korea, and Iran. Sanctions against Russia and a counterattack on DarkSide in response to the SolarWinds attack caused DarkSide to disband (Tucker & Bajak, 2023). In April 2021, the Department of Justice created the Digital Extortion Task Force focused entirely on prosecuting ransomware attackers. According to Perret (2021), these increased consequences can serve as a deterrence, especially against large attacks that can impact national interests.

NDDES Planners, Katie Leitch and Hope Brighton, visited with the 4-H Program and Planning group focused on Youth Development. The youth-driven organization recalled conversations regarding mental health issues with adults and youth. Children also advocated for themselves by talking to mentors about worries regarding school violence (i.e., shootings, bullying). Mitigation and/or prevention actions have included barriers to protect doors and secure check-systems in schools. With the prevalence of technology at school and at home, these concerns are magnified by access to the internet. Integrating technology into schools allows students to bring home tablets or laptops that may raise the risk for bad cyber actors to focus on targeting youth (Brighton, 2023). Professionals from the group had an engaging conversation about community concerns and mitigation action ideas.

North Dakota has taken several legislative steps in government to increase resilience in the state to cyberattacks. It is one of the earliest adopters of laws that require government entities to report cyberattacks to the state government. Other states have followed North Dakota's example. This policy helps the state prepare for and warn other local governments about trends in attacks and to develop warning messages and improve cybersecurity tools (Bergal, 2021). Prior to this, the state took steps to limit the ability of students to infect school-systems with malware by providing free anti-malware software to all schools beginning in 2020. While such software had been available prior to the decision to make it free, the state made it free recognizing the cybersecurity benefits to the system at large presented by any unchecked device. According to NDIT (2020), the state extended this service to local governments in 2020. This strengthens city and county governments' resiliency to cyberattacks.

Following a short hazard mitigation presentation, participants from NDDHHS's New Americans/Foreign Born/Immigrants Advisory Board discussed their experiences and challenges (Brighton, 2023). Members explained the challenges of fielding scam calls or other forms of cyberattacks at the household level that are exacerbated by being a non-native, English as a Second Language (ESL) speaker.

North Dakota has also made public education about cybersecurity a priority. In 2023, it became the first state to require cybersecurity and computer science in public education, and its practice includes teaching it in every grade. It also expanded cybersecurity curriculum and programming in higher education. In addition to creating a more informed citizenry that reduces the avenues to attack systems, the state government has recognized that this will help develop a workforce skill that is in demand, and place North Dakota students in a position to fill those positions (Weigand, 2023). As part of a general posture toward public education and readiness around cybersecurity, a risk assessment tool is available free of charge to residents who want to determine their own vulnerability, accessible at https://defend.nd.gov.

NDIT has had a central authority on cybersecurity since 2019. With the passage of state Senate Bill 2110, the state has taken an approach to unify all agencies in the state, including law enforcement, local government, and public education, around a cybersecurity strategy. According to Burgum (2019), the Department of Public Instruction developed educational standards around computer science and cybersecurity and higher education programs on cybersecurity were expanded.

Figure 4.4-14: defend.nd.gov

Source: NDIT, 2023

CyberCon, a critical infrastructure and cybersecurity conference, has been held in North Dakota annually starting in 2017 at

Bismarck State College. According to CyberCon (2023), the goal of the conference is to unify cybersecurity and critical infrastructure professionals.

North Dakota has also been on the forefront of moving beyond local-to-state sharing and pushing for more cooperation among states. The Joint-Cybersecurity Operations Command Center (J-CSOC) was founded by North Dakota in 2021. According to Freed (2022), originally developed for the purpose of information sharing between the state and neighboring Montana and South Dakota, membership in J-CSOC has grown to include at least 10 states across the country that participate in tabletop exercises to help states prepare for upcoming attacks (Freed, 2022).

According to Jamestown Public Schools, several email accounts are compromised on a weekly basis. There was also a ransomware attack in 2018.

(Stutsman County Multi-Jurisdictional Hazard Mitigation Plan, 2021)

4.4.2.11 Future Conditions

Based on information extracted from the NOAA National Centers for Environmental Information, summary for North Dakota (Frankson, 2022), the Fifth National Climate Assessment (Knapp, 2023), and related resources, there is no known direct connection among future climate conditions, and location, extent/Intensity, frequency, or duration of cyberattacks.

According to the NDSLIC, cybercriminals may take advantage of inclement weather periods and other socio-economic stressors to mask or otherwise facilitate their attacks in similar fashion to other types of criminal attacks (NDSLIC, 2023). However, such efforts would be more indirect than most criminal attacks with cybercriminals remotely targeting vulnerabilities as they are able, regardless of weather or climate concerns.

4.4.2.11.1 Extreme Climate Variability and Climate Change

Through the end of this century North Dakota's natural yet extreme climate variability will continue to be the primary influencer or signal within each of the natural hazard (Frankson, 2022). This may directly or indirectly impact jurisdictions and peoples across the state, over days to decades long timescales, and the much more subtle and gradual trends of climate change over the rest of this century may act to further extend the range of such variability (Knapp, 2023). Such studies show, both trend and variability could extend beyond that which has previously been documented in the historical record.

Recent climate change trends have shown, and future projections suggest that the state can expect continued gradual warming in all seasons, with greatest warming in the winter season. Overall precipitation is likely to increase, but with a high degree of inter-seasonal and interannual variability, which could lead to longer and stronger droughts interspersed with more frequent and more intense flooding (Swain, 2015). Severe summer and winter season storms will likely continue to occur in both drier, drought-prone periods, and wetter, flood-prone periods within the state's overall extreme climate variability. As mentioned earlier in this profile, inclement weather periods and other socio-economic stressors could be used to mask or distract officials from the criminal attack (NDSLIC, 2023). As extremely variable weather increases, the opportunities to mask attacks may expand.

While there is no direct link between Cyberattack and climate change, there is a relationship between the two that allows Cyber-criminals to exploit the effects of climate change. With increased school and

work closures due to extreme weather or pandemic response measures, more people are working remotely which increases cybersecurity risks (NDSLIC, 2023). Economic and social stressors also lead to an increase in criminal behavior via scams, identity theft, or ransomware attacks, from people who are either socially, economically, or politically motivated (Button, 2023). And extreme climate issues can further impact physical devices through the increased risk of flooding, fires, and vulnerabilities due to power outages in storms.

Future climate projections through the end of the century do indicate the potential for increased natural hazards and resultant societal insecurities and instabilities (Hoegh-Guldberg, 2018). This includes places like the Northern Great Plains region.

> In June 2021, an email was sent to all employees at the Foster County Courthouse from a commissioner asking for assistance to retrieve money and gift cards. The email came from an email address not belonging to that commissioner.
>
> Foster County residents said this threat should be number one because it can/will bring private and public sectors to a grinding halt if a major incident occurred.
>
> *(Foster County Multi-Jurisdictional Hazard Mitigation Plan, 2021)*

In a 2023 UN Security Council Report, Jean-Pierre Lacroix, Under-Secretary-General for Peace Operations, said most United Nations peace operations have faced a deteriorating security and political environment over the past several years (UNSEC, 2023). According to UNSEC, alongside other cross-border challenges, environmental degradation, and extreme weather events — amplified by climate change — have increasingly challenged missions' ability to carry out their mandates.

According to IEP (2023), from a national security standpoint, climate change may be a threat capable of multiplying and aggravating already existing problems (water shortages, droughts, etc.) as well as generating fertile ground for future personal, nation-state, and cyber security threats.

As Shackelford (2016, p. 656), suggests, "…much is to be gained by ascertaining effective interventions to promote both sustainable development and sustainable cybersecurity. Indeed, the potential for a cross pollination of best practices between these regimes beckons. Although the atmosphere and cyberspace are distinct extraterritorial arenas, they share similar problems of overuse, difficulties of enforcement, and the associated challenges of collective inaction and free riders."

Researchers have also found that increased geopolitical risk and corruption, whether enhanced by climate change or not, can in turn lead to increased CO2 emissions in those affected regions (Anser et al., 2021; Chu et al., 2023), that may lead to a feedback loop for further global instability unless policies are enacted to reduce the growth of shadow economies and their effects on geopolitical uncertainty.

4.4.2.11.1.1 Impact

Within the state, and across the Northern Great Plains (NGP) in general, the direct physical or ecological impacts from our extreme climate variability, current climate trend, or climate change projections are not expected to have a corresponding primary or direct cause/effect relationship to cyberattack, much like a criminal attack or civil disturbance, based on global analyses (Benjaminsen, 2016). However, there may be secondary or indirect effects on certain regions where climate change may trigger, accelerate, and deepen existing civil or personal instabilities (IEP, 2023), including the NGP region.

Climate change in the post-industrial era, to-date, is suspected by some of having affected food production and exacerbated food insecurity in certain developing countries of Sub-Saharan Africa (Aribigbola et al., 2013; Evans & Munslow, 2021). However, physical science studies of these same areas have found that interannual or multi-decadal climate variability appear to be the underlying cause of recent drought and flood episodes (Paeth et al., 2011; Taylor et al., 2017), much like what has been shown for the Northern Great Plains region (Hoell et al., 2019; Hoell, 2023). As was discussed in Section 3, such short-term climate variability quite often leads to substantial impacts while background climate trends can seem harmless.

4.4.2.11.1.2 Adaptation

There are no expected direct impacts expected by climate change on cyberattack activities in the NGP region, so there are no specific adaptation actions at this time other than those already suggested as part of other hazards.

4.4.2.11.1.3 Mitigation

There are no expected direct impacts expected by climate change on cyberattack activities in the NGP region, so there are no specific mitigation actions at this time other than those already suggested as part of other hazards.

4.4.2.11.2 Other Changes

The increase in remote work for public and private employees provides new opportunities for hackers. Remote work brings in home networks and home computers into work networks, increasing the points of attacks while decreasing IT departments' reach.

Figure 4.4-15: Remote Work Opens New Doors to Cybercriminals

Source: Scandinavian Wilderness, YouTube, 2020

IT departments indicated that they have decreasing confidence in their cybersecurity effectiveness after COVID-19, with confidence falling from 71 percent to 44 percent from March 2020 to December 2021.

The lack of physical security of workers' workspace is a primary concern for 47 percent of polled cybersecurity professionals, with a belief that cybercriminals will see these workers as soft targets for 71 percent of respondents. According to the Ponemon Institute (2020), many companies have workers using their own devices for work, which opens more avenues to cyberattacks, since businesses have limited ability to bolster security on personal devices.

According to Brooks (2022), the increase of cryptocurrencies provides a new outlet for exploitation for cybercriminals. In 2021, $17.5 billion of cryptocurrencies were stolen, but that number is expected to rise to $30 billion by 2031. One component leading to increased risk is the lack of a cybersecurity workforce. There are expected to be 3.5 million unfilled cybersecurity jobs by the end of 2025 due to a lack of qualified applicants (Brooks, 2022). While actions in cybersecurity education in the state may work to counteract this looming risk, these educated North Dakotans will be in high demand in the state and elsewhere, which may leave North Dakota employers unable to compete for North Dakota-educated cybersecurity workers.

4.4.3 Risk Analysis

Risk can be defined as the potential for loss of or damage to an asset (FEMA EMI, 2023). This section analyzes the potential for loss or damage in the state of North Dakota.

4.4.1.1 National Risk Index

The National Risk Index does not evaluate this hazard.

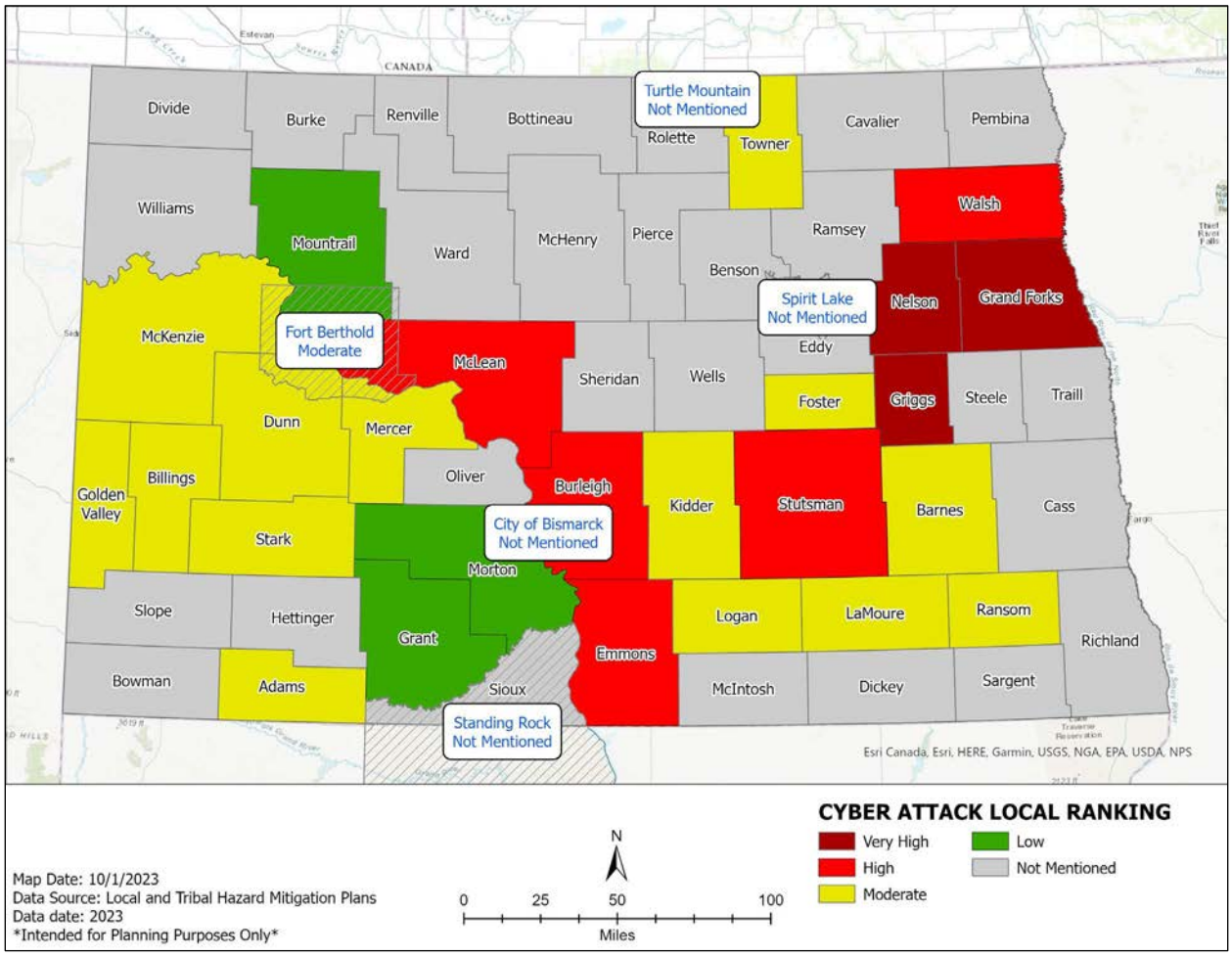
4.4.1.2 Risk Index Score

The Priority Risk Index for this plan update ranks cyberattack as a high risk with a score of 3.4. Cyberattack is ranked 4th out of 15 hazards.

4.4.3.1 Jurisdictions at Risk

Just 26 of 58 local or tribal mitigation plans identify cyberattacks as a hazard in their communities. The eastern counties of Grand Forks, Griggs, and Nelson identify it as a Very High risk. Central counties of Burleigh, Emmons, McLean, and Stutsman, along with eastern Walsh County identify it as a high risk.

Figure 4.4-16: Local and Tribal Mitigation Plans Assessment of Cyberattack Risk by County



Source: Local and Tribal Mitigation Plans, 2023

4.4.4 Summary/Conclusion

The following bullets summarize highlights and conclusions related to cyberattacks.

- North Dakota has been and will be the target of cyberattacks.
- Cyberattacks are increasing in frequency and sophistication over time, particularly, as AI products develop.
- Pipelines and government contractors can be popular targets for actors trying to undermine public trust in government and create chaos.
- Attacks on critical infrastructure systems could have devastating consequences to society.
- North Dakotans have lost more money per capita from cyberattacks than residents from other states.
- Cyberattacks on healthcare networks are increasing and the consequences can be felt in the loss of life, increased distance in ambulance travel and prolonged suffering due to delayed

procedures. The increasing number of medical devices connected to the internet increases the opportunities for cybercriminals.

- Education and government are top targets for cyberattacks due to the large number of users in the network that provides opportunities for hackers.
- Small businesses may be seen as soft targets for hackers and can be financially harmed from cyberattacks to the level of closure. This has also happened to a hospital.
- Phishing attacks are the most common attacks to state and local government, but malware and internal bad actors are serious risks to the state as well.
- Public access computers and internet hot spots are vulnerable to attacks. Limited access to broadband internet in some areas make these services necessary and heavily trafficked, increasing the opportunities for malware and cyberattacks on local government networks.
- North Dakota has been a leader in creating information sharing networks and laws to help every level of government have the best available data to combat cyberattacks.
- North Dakota has prioritized cybersecurity education and public information and tools to residents, businesses, and institutions to reduce exposure to cyberattacks in the state.
- Remote work provides more opportunities to defend against cyberattacks.
- Cybersecurity workforce shortages are expected to become critical in the next decade, but North Dakota is working on increasing the opportunities to prepare for this field.

4.4.5 Data Limitations

Partially because cyberattacks are a relatively new hazard with limited government tracking, there is not a true and accurate centralized tracking entity for cyberattacks. Not all states have reporting laws like North Dakota's and private breaches that don't involve the potential disclosure of private data are not necessarily shared with the public. According to Bergal (2021), the true probability of a successful attack is therefore limited to publicly shared data.

4.5 Severe Winter Weather

4.5.1 Overview

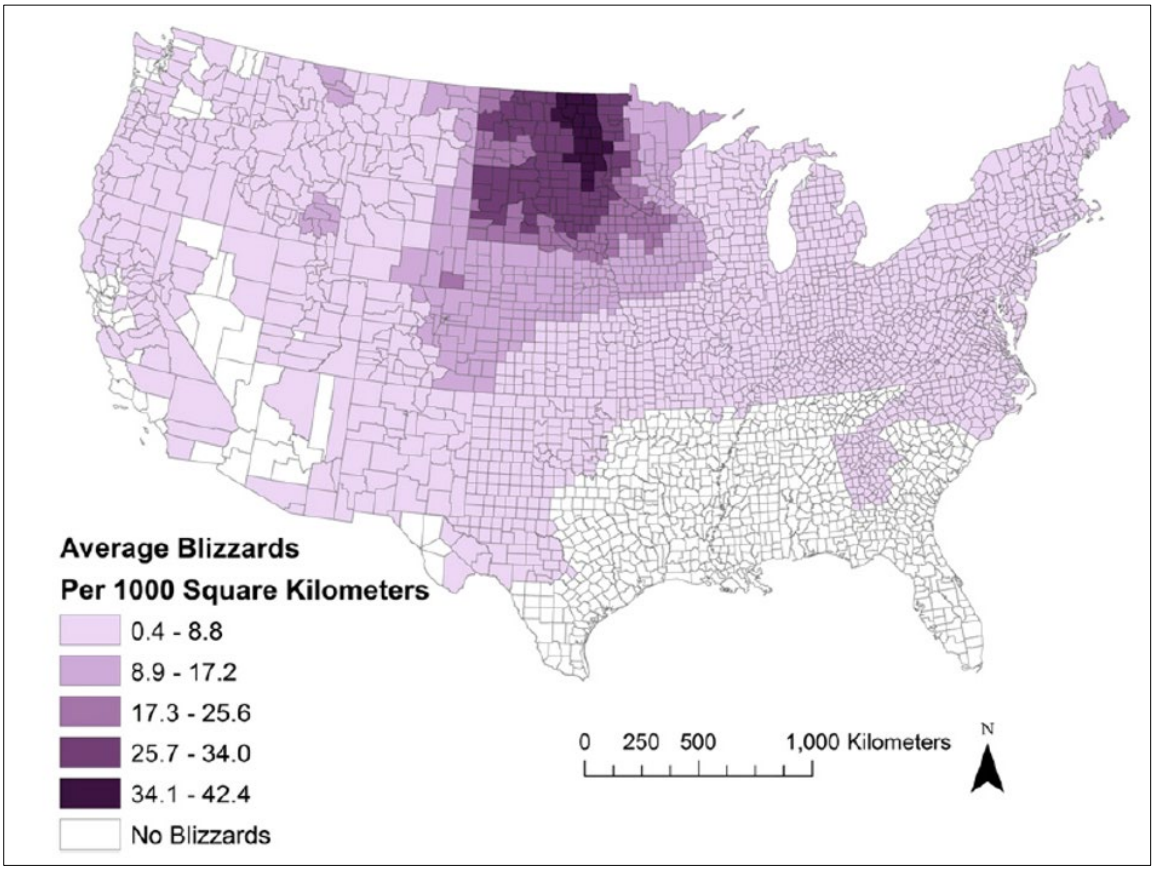
This section defines the types of severe winter weather that can impact North Dakota.

4.5.1.1 Description

4.5.1.1.1 Blizzards

According to the NOAA's National Weather Service (NWS, 2023), a blizzard is an especially intense and impactful winter storm in which the following conditions are met: 1) sustained winds or gusts exceeding 35 miles per hour; 2) considerable falling and/or blowing snow that reduces visibility frequently below a quarter mile; and 3) lasting for at least three hours. As **Figure 4.5-1** shows, North Dakota experiences

Figure 4.5-1: Average Blizzards Per 1000 Sq. Km. (386 Sq. Mi.), 1959/60 - 2013/14



Source: Coleman and Schwartz, 2017

the highest frequency of blizzard conditions of anywhere in the contiguous United States (Coleman & Schwartz, 2017). Blizzard data are compiled at the county scale by NOAA's National Center for Environmental Information (NCEI: StormData, 2023). The average size of a ND county is around 1,334

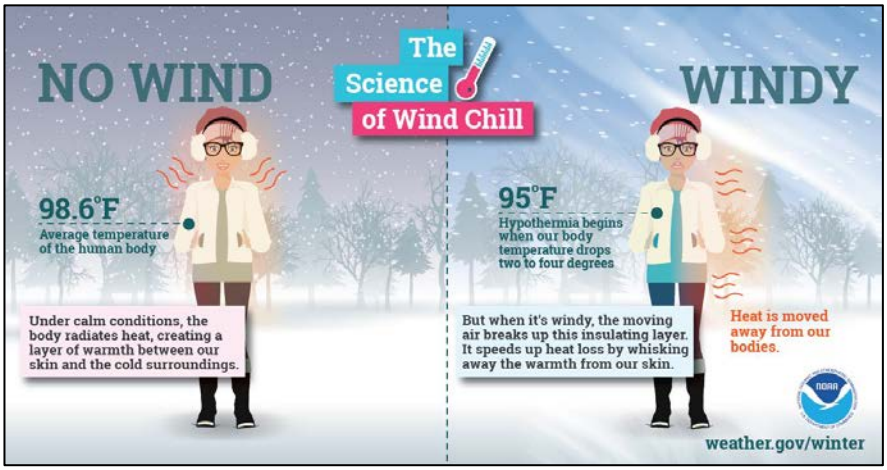
square miles, or roughly 3.5 times that of Coleman's (2017) analysis grid, this corresponds to a range of 1 to 3 blizzards per winter season from west to east across the state. The analysis includes the occurrence of ground blizzard conditions, or those situations where the very low visibility is primarily due to blowing snow and all other criteria are met.

Recent research has examined the characteristics of the Red River Valley of eastern North Dakota and its markedly higher occurrence of such conditions which are largely due to the prevalence of winter season snow cover and the coincidence of high wind periods (Trellinger, 2018; Kennedy et al., 2019). During the exceptionally windy winter of 2021-2022, portions of relatively snow-free western North Dakota often encountered High Wind Warning conditions while much snowier eastern North Dakota was in Blizzard Warning conditions (Gust, 2022). Thus, across North Dakota, the variations in blizzard occurrence are at least in part due to the variations in the prevalence of snow cover.

4.5.1.1.2 Extreme Cold/Wind Chill

In a North Dakota winter, temperatures often drop low enough to provide the threat of frostbite to exposed skin, and so extremely cold that they become life threatening to the unprotected (NWS-Cold Weather Safety, 2023). Wind chill recognizes that increased wind speeds can accelerate heat loss from exposed skin such that the "apparent temperature" is effectively much colder. **Figure 4.5-2** shows how this might occur.

Figure 4.5-2: The Science of Wind Chill



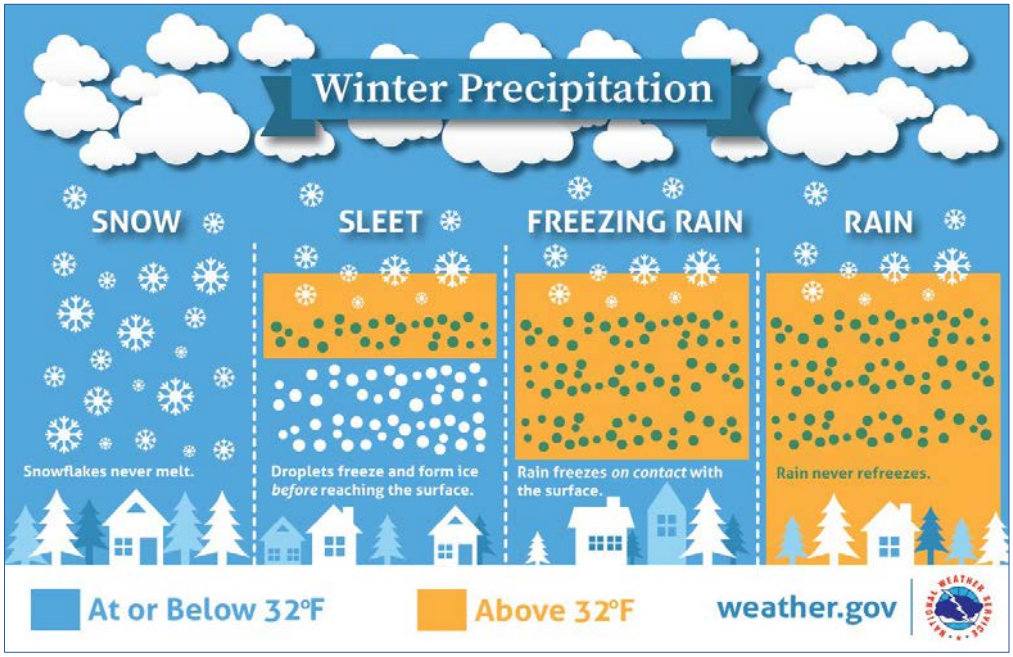
Source: NWS, 2023

Like blizzards, North Dakota has the highest incidence of extreme cold/wind chill conditions in the contiguous United States, second only to Alaska (IEM, 2023). The NWS offices serving North Dakota issue a Wind Chill Warning when the apparent temperature, either wind-enhanced or actual cold temperatures are expected to be a direct threat to life (NWS Bismarck, 2023). An Advisory is issued for lesser criteria, where conditions could become life threatening if proper precautions aren't taken.

4.5.1.1.3 Heavy Snow

Across the Northern Great Plains states, The NWS (2023) defines heavy snow as an accumulation of at least 6 inches in 12 hours or fewer, and/or at least 8 inches in 24 hours or fewer. More southern and/or coastal locations have substantially lower thresholds. North Dakota is among the states with the highest

Figure 4.5-3: Distinguishes between various types of winter precipitation



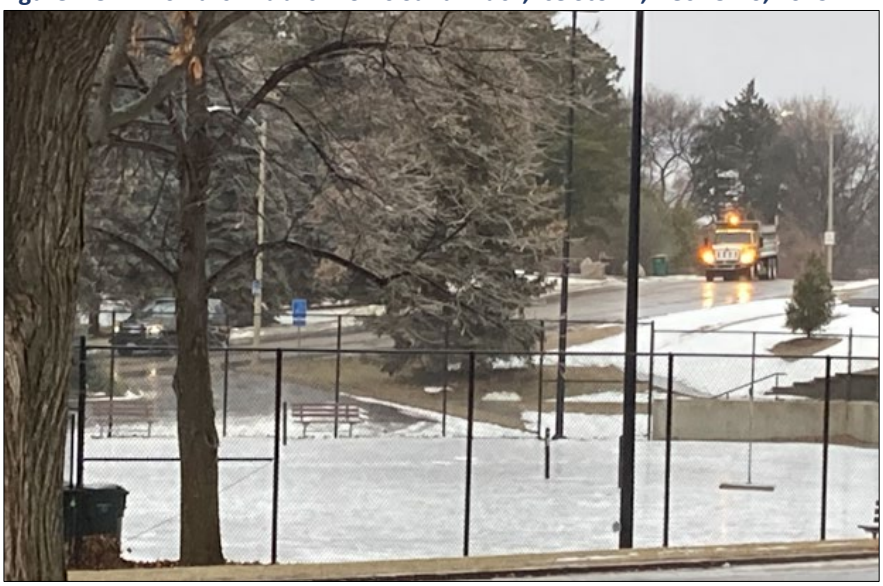
Source: NWS, 2023

incidence of heavy snow events (IEM, 2023). A Winter Storm Warning is issued for heavy snow alone and for heavy snow in combination with appreciable mixed precipitation and/or blowing snow.

4.5.1.1.4 Ice Storms

An ice storm is a winter event in which damaging accumulations of ice from freezing rain, greater than or equal to one-quarter inch, occur (NWS, 2023). Significant ice accumulations on walking surfaces, roadways, rails, or airport runways can pose a serious risk to pedestrians or travelers alike. Ice accumulations on roofs can cause structural issues. Ice accumulations on power lines and tree branches, especially when combined with strong winds, can lead to downed power lines, widespread power outages and debris clogged transportation arteries. Local NWS offices will issue an Ice Storm Warning when these conditions are occurring, are imminent, or have a high probability of occurring (NWS, 2023).

Figure 4.5-4: Bismarck Public Works Sand Truck, Ice Storm, Dec 25-26, 2023.



Source: Ryan Thompson, 2023. Reprinted with permission.

4.5.1.1.5 Snow Squalls

Snow squalls are intense, but limited duration, periods of moderate to heavy snowfall, accompanied by gusty surface winds resulting in reduced visibilities and often whiteout conditions. They move in and out quickly, and typically last less than an hour (NWS, 2023). Although snow accumulations are generally not significant, the combination of accumulating snow, gusty winds, falling temperatures and quick reductions in visibility can cause extremely dangerous conditions for motorists.

Snow squalls are a short-fuse, convective-type event, which occurs in the wintertime. These can be singular convective storm cells, or lines of convective storms, that produce brief periods of intense heavy snow and wind, with significant reductions in visibility and the possibility for a rapid "flash" freeze of pavement, where roads or walkways are not already frozen (NWS, 2023). A snow squall or series of snow squalls differ from blizzard conditions due primarily to their much shorter duration and coverage. A driver experiencing a series of snow squalls may encounter several minutes with near white-out conditions; followed by a gap of lighter winds, improved visibility, maybe even sunshine; followed by another period of near white-out conditions in snow and wind. Snow squalls are relatively rare winter weather events in the Dakotas and Minnesota, as compared to other winter storm types.

4.5.1.1.6 Other Severe Winter Weather Hazards

Frost is the formation of ice crystals on the ground or other surfaces that form when the temperature of those surfaces falls below freezing, even while the air temperature above those surfaces remains above freezing, and usually with little or no wind. Frost on a vehicle windshield is certainly a nuisance though it can be beautiful on tree limbs in mid-winter. Frost is especially troublesome at any time during the growing season, especially for crops that are sensitive, and when pollination can be impacted in the spring or crop maturity can be hampered in the fall (NWS Glossary, 2023). The NWS will issue a Frost Advisory when widespread minimum temperatures in the low to middle 30s (33-36 degrees Fahrenheit) are expected during the growing season and sufficient low-level moisture, clear skies and light wind conditions will favor frost formation. Advisories are generally issued 12-36 hours before the episode.

A freeze is considered more severe than a frost, with actual air temperatures dropping below freezing over a large geographic area and for an extended period of time (NWS Glossary, 2023). A freeze is more likely to impact agricultural output, as a hard freeze at 28-29 degrees Fahrenheit can put a very abrupt end to the growing season for all but the hardiest of plants. A Freeze Warning is issued when widespread (multiple counties, multiple hours) minimum temperatures below 32 degrees Fahrenheit are expected during the growing season. (NWS Bismarck, 2023). In North Dakota, Freeze Warnings are suspended at the end of the growing season when the average low temperatures drop below freezing – otherwise, each day of the ensuing winter season would have a warning!

As the NWS states (2023), freezing fog is a weather event in which the vapors of a fog freeze as it encounters exposed objects which are at or below freezing, quickly forming ice on surfaces. During a period of freezing fog, walkways and roads can become quite slippery in spots, thus warranting a Freezing Fog Advisory. And cold, dry windshields on vehicles, trains and aircraft can quickly glaze over in ice upon entering a patch of freezing fog. If the freezing fog is also quite dense, with visibilities at or below a quarter mile, a Dense Fog Advisory will likely be issued.

Sleet is precipitation that freezes to form ice prior to reaching the surface, while freezing drizzle or freezing rain are precipitation that falls as a liquid but freezes on contact with the ground or with other cold surfaces. According to the NWS (2023), sleet, freezing drizzle or freezing rain will warrant a Winter Weather Advisory from the local NWS office when such precipitation is expected to become a nuisance but remain below warning criteria.

November 2019. A blizzard required the sheltering of 50 people at the Coffee Cup Travel Plaza and 15 people at the Cobblestone Hotel.

(Kidder County Multi-Jurisdictional Hazard Mitigation Plan, 2021)

Variable winter conditions can provide their own hazards. The freeze-thaw cycle can damage asphalt and ground surfaces creating cracks and potholes that can damage cars and cause accidents. According to the NWS Glossary (2023) Melting and re-freezing of snow and ice on pavement or walkways can create areas of “black Ice”, or ice that is not easily seen.

4.5.1.2 Previous Occurrences

The following section describes notable and recent events of severe winter weather in North Dakota.

- January 2019 gave North Dakota the distinction of being one of the coldest areas in the nation for the month (Williams, 2019). It grew cold enough that wind turbines across the state stopped rotating, which occurs at -20 degrees, to protect them from damage (Baumgarten, 2019). Grand Forks recorded temperatures as low as -35 with accompanying wind chills of -65 (Williams, 2019). According to Williams (2019), the month’s average temperature was a mere 2 degrees and peaked at 38 degrees.
- Winter snow came early to eastern North Dakota in 2019 when from 12 to 36 inches of snow fell on October 10 and 11. Early snows, including this one, are typically wetter than most, often causing significant tree limb breakage, especially when fall foliage is still on the trees to catch the weight of the wet snow (NWS Grand Forks, 2018). According to MacFarlane (2018), corn, soybean, and sugar beet farmers took a big hit from the snow, as their harvest had been delayed by heavy rains, and the snow hit when less than a third of these crops had been harvested.
- Much of January and February 2021 brought frigid cold and wind chill across the nation, notoriously knocking Texas into the dark, but challenging North Dakotans’ tolerance to the winter. Fargo had its longest stretch below zero since 1996, a 10-day stretch (Weather.com, 2021). According to Huttner (2021), Langdon recorded a -60 degrees wind chill on February 12, a weekend when no town in the Red River Valley was spared of wind chills of at least -30.

- New Year's Day 2022 started with a record cold in Fargo with a -27 reading at Hector Field that tied a 2010 record (Schmidt, 2022). Grand Forks set a new low of -37, lowering its 2010 record by 4 degrees (Schmidt, 2022). The city of Bowbells recorded a wind chill as low as -59 later that week, as sundogs, which are colored lights from ice crystals in the air, formed over the region (Nicholson, 2022) as shown in **Figure 4.5-5.**

Figure 4.5-5: Sundogs over western ND, January 2022.

Source: Helm, NDDOT Bismarck District; 2022. Reprinted with permission.

- Beginning on April 12, 2022, a record April snowfall covered western and central North Dakota with as much as 3 feet of snow with drifts exceeding 8 feet as seen in **Figure 4.5-6** (NWS Bismarck, 2022; North Dakota State Highway Patrol [NDHP], 2022). Winds exceeded 60 miles per hour and snow fell through April 14 (NOAA NWS Bismarck, 2022; NDHP, 2022). Most roads in central and western North Dakota had no-travel advisories and several were closed via barriers.

  To prepare for possible rescue missions, NDHP pre-staged snow-ready utility vehicles such as snowmobiles in 13 different cities in the most snow-affected areas (NDHP, 2022). Motorists were aided after being stranded on I-94 near Steele, Dickinson, Bismarck and at Crystal Springs, on Highway 36 in Pingree, Elgin, Watford City, New Salem, and Almont. Accidents included a rental truck/police truck crash in Bismarck, a crash in Sterling and a Driving Under the Influence citation in Belfield (NDHP, 2022).

  On the second day of the blizzard, the North Dakota Department of Transportation (NDDOT), NDHP, North Dakota Department of Emergency Services (NDDES), North Dakota Parks and Recreation, and the North Dakota Snowmobile Club worked together to help rescue stuck snowplows near Minot, then rescue the rescuers (NDHP, 2022). The state closed its non-essential business for three days, including closing the Capitol and having state employees work remotely (Nicholson, 2022). Flights were canceled, schools went to virtual learning activities, and other operations halted in the state (Nicholson, 2022). According to Dunteman (2022), a little more than a week later, the snow began to fall again, with another 18 inches falling in northwest North Dakota.

- A storm that began on November 9, 2022, resulted in snow in the Dickinson district and freezing rain primarily in the Valley City and Fargo districts. Throughout the event, 7,287 NDDOT staff hours were put in working the statewide event. Included in the total hours were 6,006 hours operating plows, 100 hours operating tractors with snow blowers and 20 hours operating motor graders. This storm resulted in the use of salt and brine. Approximately 4,629.5 tons of salt or salt/sand was used, as well as 359,591 gallons of salt brine.

Figure 4.5-6: Winter Guest, Stanley ND, 2022

Source: Wheeler, 2022. Reprinted with permission.

- In December 2022, another set of twin blizzards would impact the Christmas shopping season with a system that stalled over the state, dumping 1 to 2 feet of ice and snow from December 13 to December 17, 2022, closing both interstate I-94 and I-29 for travel. After five days of accumulating fresh snow, the 30 to 50 mile per hour winds blew the accumulated snow causing whiteout conditions (Dunteman, 2022). Cold temperatures and high winds brought wind chills into the -40s. The heavy and wet snowfall caused extensive damage.

- January 16-20, 2023, brought freezing fog and ice storms across north and central North Dakota that snapped power lines and structures causing power outages in the coldest month of the year. Damage assessments of $1.5 million to electrical infrastructure, resulted in a state-declared disaster (Burgum, 2023). The month included 15 days of fog across much of the state.

- Beginning on March 10, 2023, a snowstorm blanketed southern North Dakota with up to 15 inches of snow from Bismarck to Fargo, concentrating its fury on the I-94 corridor (NOAA NWS Grand Forks, 2023). The interstate closed from Bismarck to Fargo (NOAA NWS Bismarck, 2023). Snow came through in bands, making plow progress difficult (Baumgarten and Van Der Stad, 2023). According to Baumgarten and Van Der Stad (2023), Fargo and nearby cities issued no-travel advisories due to the large number of cars stranded on secondary streets. The spring snowstorm impacted cattle and their infants during calving season.

- Between April 4 and April 6, 2023, heavy snow impacted central and eastern North Dakota, resulting in many blocked roads and road closures across the region, as depicted in **Figure 4.5-7**. For the three days of Tuesday, April 4 through Thursday, April 6, NDDOT operated an average of 330 snowplow trucks per day working 11,100 hours. In addition, over the event the department worked 973 hours operating blowers, motor graders, dozers, skid steers and loaders. 1,664 tons of salt or salt/sand was used, as well as 236,165 gallons of salt brine.

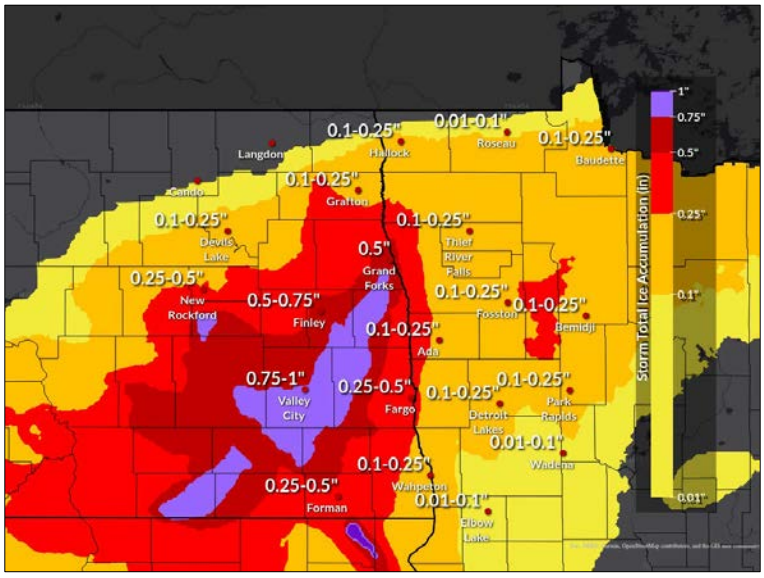
Figure 4.5-7: Snow covered road, April 2023

Source: NDDOT, 2023. Reprinted with permission.

- An early winter season storm hit the central and northeast portions of the state, in two waves, on October 25 and October 27, 2023, resulting in accumulations of from 6 to 16 inches of snow. These twin storms led to hazardous road conditions due to an especially wet, heavy snowfall. NDDOT collaborated with other agencies, including NDHP, NDDES and North Dakota State Radio (NDSR) to coordinate highway closures. As they also worked tirelessly to reopen those roads.

- The last winter storm of Calendar Year 2023 hit southern and eastern portions of the state as periods of heavy rain beginning December 23-24, turning to periods of freezing rain from Christmas Day, Dec 25 through Dec 27. **Figure 4.5-8** shows estimated ice accumulations from December 25-27.

Figure 4.5-8: Estimated Ice accumulations, December 25-27, 2023.



Source: NWS, 2023

The total accumulated precipitation approached from 2-4 inches of both rain and freezing rain across the southeast corner of the state, into west-central Minnesota. Since the area landscape was largely frozen over, the surface runoff was higher and faster than usual, which pushed the Red River of the North into Minor Flood stage at Fargo for the first time in any similar Dec-Jan period, since daily records began in 1901 (USGS, 2023). Fortunately, there were no significant impacts to the area from the river rise.

On the other hand, ice storm impacts were much more widespread and significant than the flooding. **Figure 4.5-9** shows just one of over 2000 wooden power poles that were snapped by the weight of ice and the force of winds over the 13 most affected counties (North Dakota Governor's Office, 2024). Total storm damage costs exceeded $11.5 million, nearly 8 times the cost of the January 2023 combination Freezing Fog and Ice Storm mentioned above.

As reported by Tri-state Livestock News (Thomas, 2024), the Cass County Electric Cooperative experienced their first power outages in the afternoon of Christmas Day 2023, with over 4600 member accounts affected through year's end.

While crews for Cass County Electric, Dakota Valley, and other affected utilities, worked throughout the ensuing holiday week farms and ranches struggled with the loss of power, frozen water troughs, and slippery, ice-covered feedlots and pastures. By January 2nd, thick ice chunks were still falling off of power lines.

Figure 4.5-9: Shattered Power Poles, end of December 2023

Source: Cass County Electric Cooperative, 2023. Reprinted with permission.

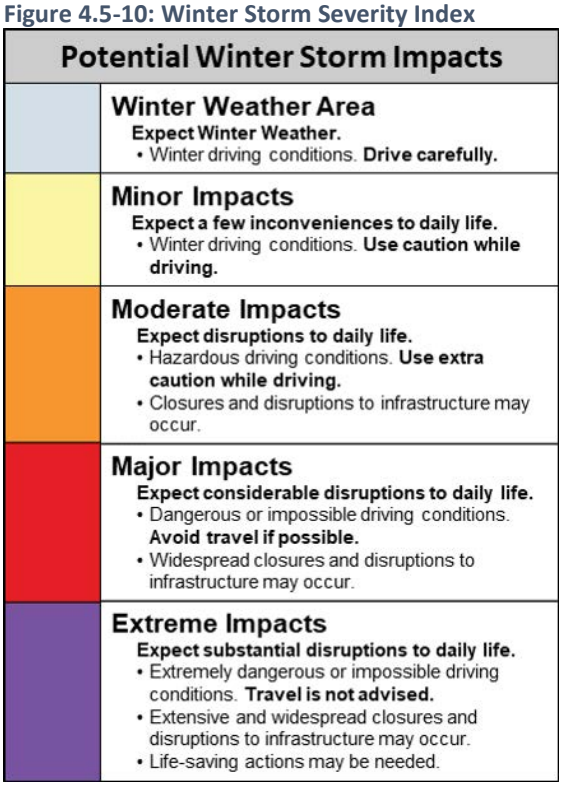
> The smaller cities [in Mountrail County] use contractors on occasion but usually volunteers from the community, some who are existing or former city council members, do the work. Some volunteers bring their own equipment. The approach is clear; these local governments do what needs to be done and some years the only way to keep up is to prepare to work a lot of hours. The expense of snow removal is a real concern.
>
> *(Mountrail County Multi-Jurisdictional Hazard Mitigation Plan, 2022)*

4.5.1.3 Location and Extent

The location, intensity, and impacts of developing winter storms are depicted by the NWS Weather Prediction Center using the Winter Storm Severity Index (WSSI), shown in **Figure 4.5-10**. WSSI is a spatial assessment of the societal impacts of winter storms that highlights areas with the forecasted potential for damaging and life-threatening effects brought on by winter weather (NOAA, 2023). WSSI allows forecasters, emergency management, and the public to make informed and tactical decisions about the potential for significant weather-related impacts. According to NOAA (2023), WSSI is comprised of six components of winter storms:

- Blowing snow,
- Flash freeze,
- Ground blizzard,
- Ice accumulation,
- Snow amount, and
- Snow load.

Figure 4.5-10: Winter Storm Severity Index

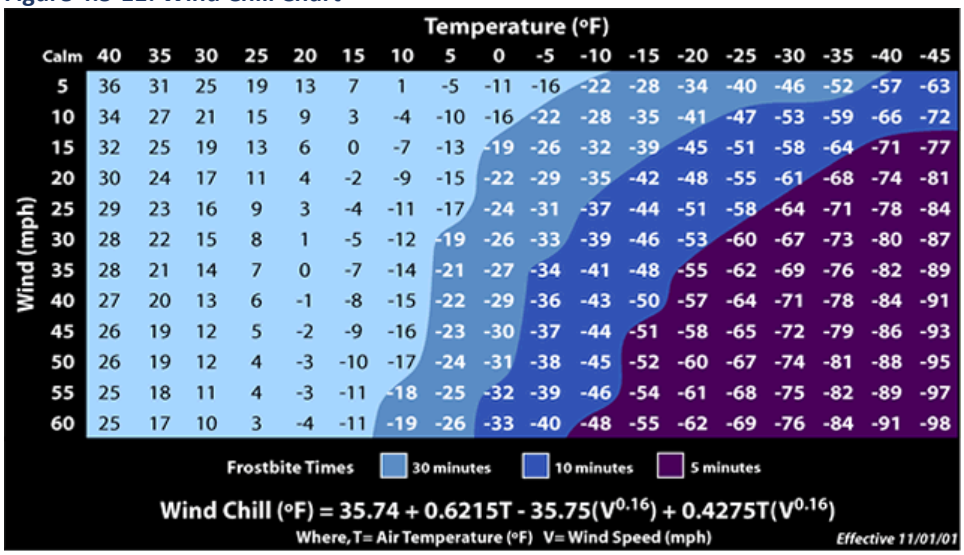


Source: NOAA Weather Prediction Center, 2023

The WSSI is strictly a gauge of anticipated or forecast storm conditions and potential impacts, with no direct correspondence to any post-storm analysis of actual storm intensity or impacts produced by the storm. Also, the WSSI does not integrate extreme cold or wind chill, a very common North Dakota winter storm ingredient.

Figure 4.5-11 shows the wind chill chart that determines the apparent or "feels-like" temperature based on the ambient air temperature and the wind speed. According to NWS (2001), wind chill severity is described in the amount of exposure time that it takes for frostbite symptoms to appear.

Figure 4.5-11: Wind Chill Chart



Source: NWS, 2001

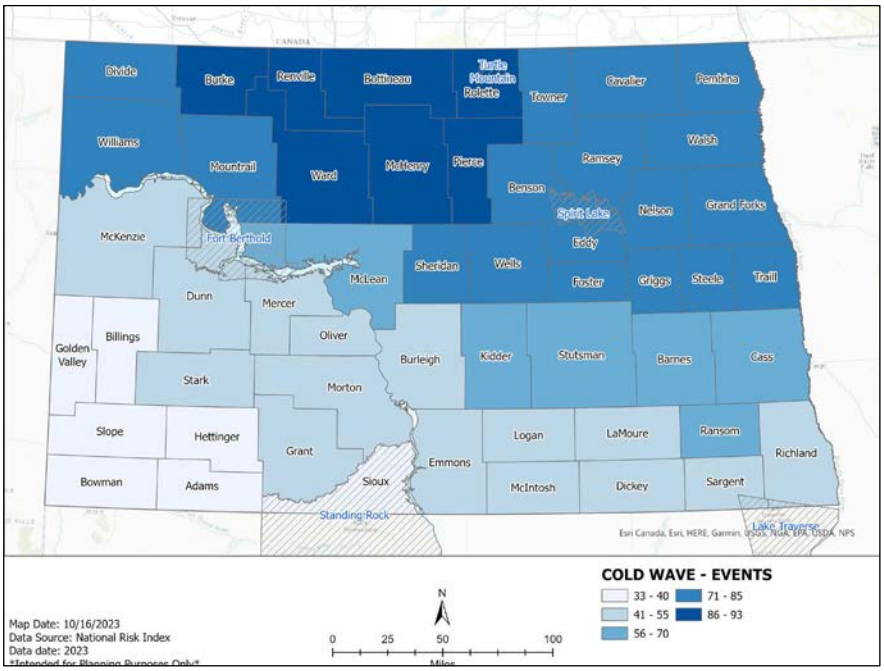
Figures 4.5-12, 4.5-13 and **4.5-14** are maps showing the number of cold wave event days and overall severe winter event days using FEMA's National Risk Index (NRI) and NOAA's NCEI. The NRI shows data limited to 16 winter seasons 2005-06 through 2021-22 and is based on warning days. The NCEI information extends back a decade further, to 1996, and is based on verified event days. Regardless, a common pattern emerges from both datasets - that no county in the state is safe from severe winter weather.

Figure 4.5-12 shows cold wave event days as identified in the shorter-range NRI. According to NRI (2023), north-central North Dakota received a higher frequency of cold snaps during the most recent 16-year period.

In contrast, **Figure 4.5-13** shows a southeastern ND skew with regard to overall winter weather events. With east-central and southeastern counties having two or more times the number of winter weather warning event days as western counties.

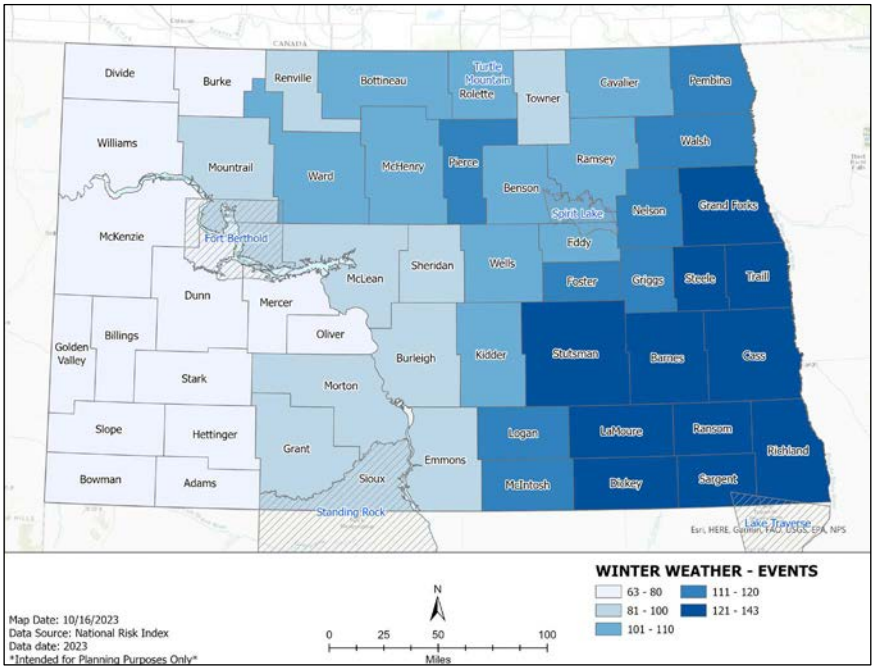
However, the NRI dataset shows that the lowest number of severe cold wave events for any county was 33, about 2 per year, and the lowest number of severe winter weather events was 63, about 4 per year. This simply confirms that severe winter weather is something that all jurisdictions in the state experience every single year, and it's a hazard that all residents must be prepared for.

Figure 4.5-12: National Risk Index Cold Wave Event Days, 2005-2022



Source: NRI, 2023

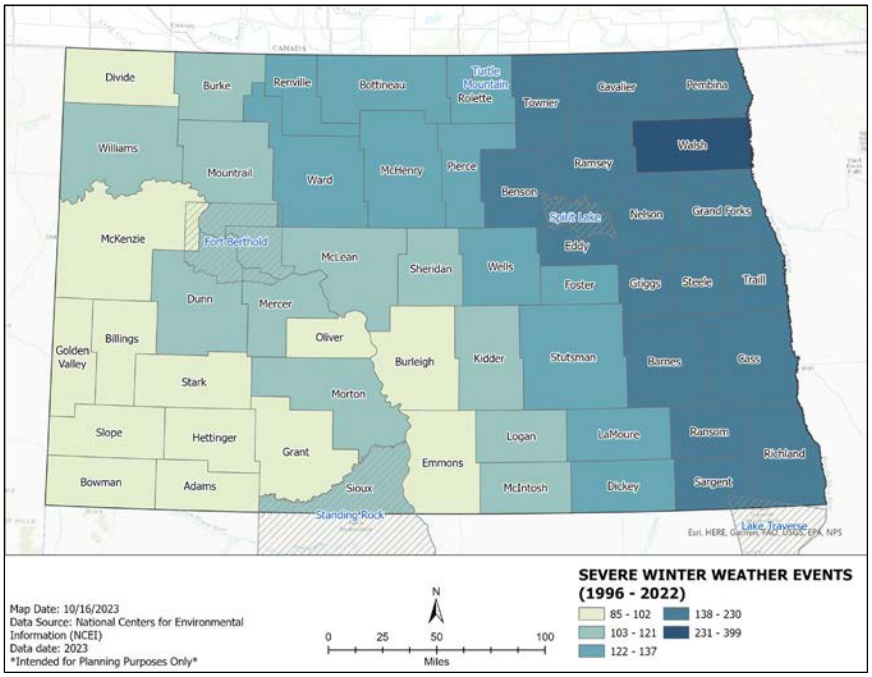
Figure 4.5-13: National Risk Index Winter Weather Event Days, 2005-2022



Source: NRI, 2023

The 26-year NCEI (2023) dataset is displayed in **Figure 4.5-14**. This storm verification database shows that the eastern third of the state experiences two or more times the number of severe winter weather events as the western third. The markedly higher event total in Walsh County is misleading, in that both western and eastern halves of that county are tracked for certain event types.

Figure 4.5-14: NOAA NCEI Severe Winter Weather Event Days, 1996-2022

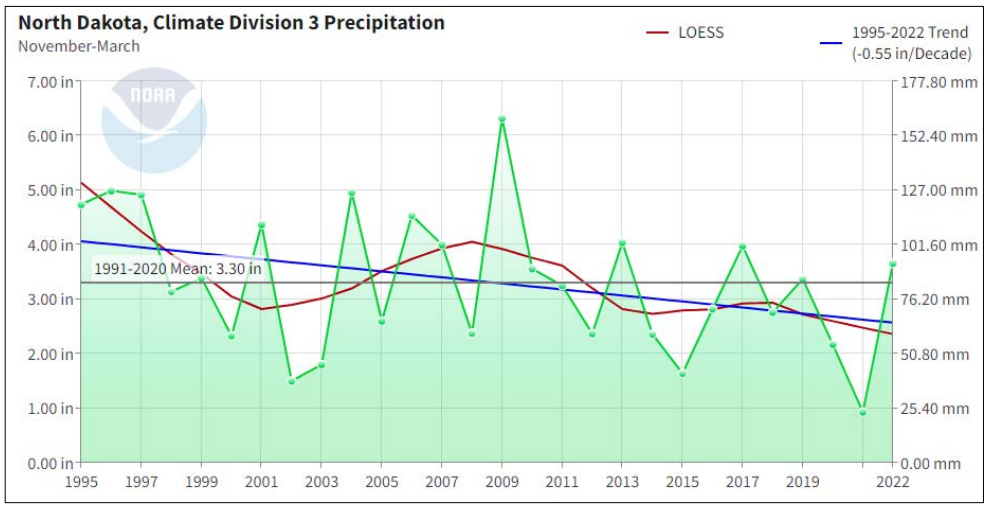


Source: NCEI, 2023

However, there is a northeastward shift in total severe winter weather event days from the NRI dataset to the NCEI dataset. This shift is due in part to the difference between a warning database and a verification database, and in part to the NCEI database containing the additional period from 1996-2005.

Figure 4.5-15 illustrates the recent, apparent decrease in precipitation during the 5-month winter period (Nov-Mar), for North Dakota Climate Division 3, northeast ND. Not shown is the corresponding increase in winter period temperatures during this same period. In addition to the infamous winter of 1996-1997, with its record level snowfalls and bitter cold (NCEI, 2023). The earlier 10-year period had overall colder and snowier than average winter seasons across the north central and northeast portions of the state, based on the current 30-year (1991-2020) climate averages. Meanwhile, the most recent 10-year period has generally been both drier and warmer than the average.

Figure 4.5-15: Northeast ND, Winter Season (Nov-Mar) Precipitation Trend, 1996-2022



Source: NOAA NCEI Climate-at-a-Glance, 2023

NOAA National Centers for Environmental Information (NCEI) produces the Regional Snowfall Index (RSI), displayed in **Figure 4.5-16**, for significant snowstorms that impact the eastern two thirds of the United States. The RSI ranks snowstorm impacts on a scale from 1 to 5, like the Fujita Scale for tornadoes or the Saffir-Simpson Scale for hurricanes (NCEI, 2023). The RSI differs in that it accounts for population in addition to the spatial extent of the storm and the amount of snowfall. However, it lacks the primary additional factors that affect typical winter storm intensity in the Northern Great Plains, such as the impacts of mixed precipitation types, wind, blowing and drifting snow, extreme cold, and wind chill. In addition, the current RSI matrix only includes storms that have occurred within the

Figure 4.5-16: NOAA NCEI Regional Snowfall Index

Category	RSI Value	Description
1	1–3	Notable
2	3–6	Significant
3	6–10	Major
4	10–18	Crippling
5	18.0+	Extreme

Source: NCEI, 2023

November-April period, thus ignoring events like the Devils Lake Basin's record setting snowfall during the October 10-11, 2019, Heavy Snow event, discussed in Section 4.5.1.2, above.

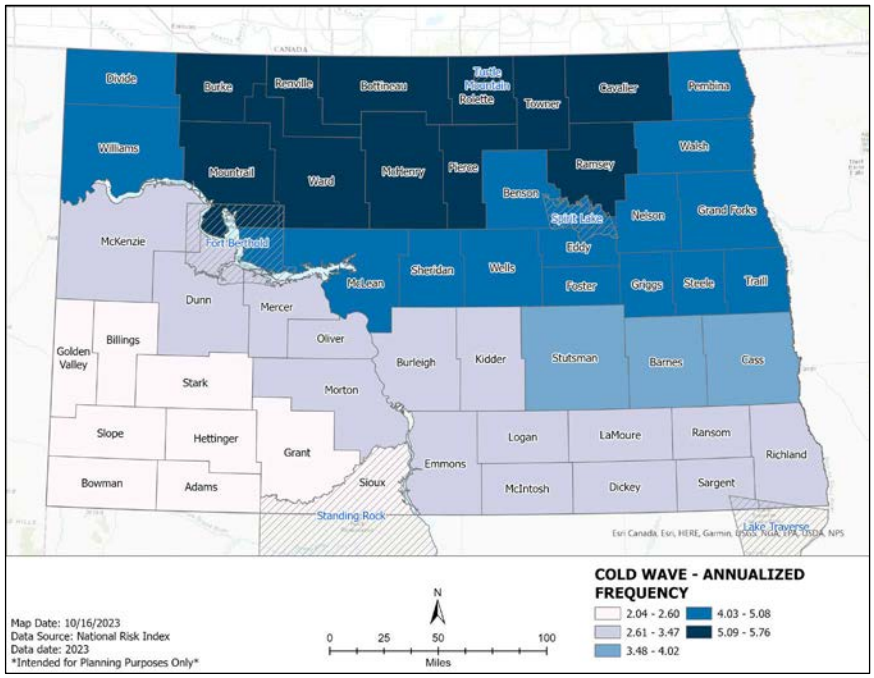
These are recognized shortcoming of most winter severity indices, including the Accumulate Winter Storm Severity Index (AWSSI), used in an accumulative mode across the United States (Mayes Boustead, et al., 2015), and the Winter Storm Index (WSI) used across portions of Canada (Matthews, et al., 2017). An additional and critically important feature of any future index development would be the capacity to consider all of these potential winter impacts across the entire Northern Great Plains winter season.

4.5.1.4 Probability

All of North Dakota experiences severe winter weather of some fashion or other, every single year, with certain areas of the state having a higher probability of the experience. **Figures 4.5-17, 4.5-18** and **4.5-19** show data related to the probability of severe winter weather occurring annually using the NRI and NCEI datasets described above.

Figure 4.5-17 shows the annual number of event days by county for cold waves. The northern half of the state east of the Missouri River experiences more than 4.5 cold waves each year (NRI, 2023). South and west of the West of the Missouri River, only Mercer County experiences more than 3.00 event days, annually. In the higher elevations of the southwest, warming westerly Chinook winds are more likely to prevent or clear out any dense cold air, more quickly than in the north and east.

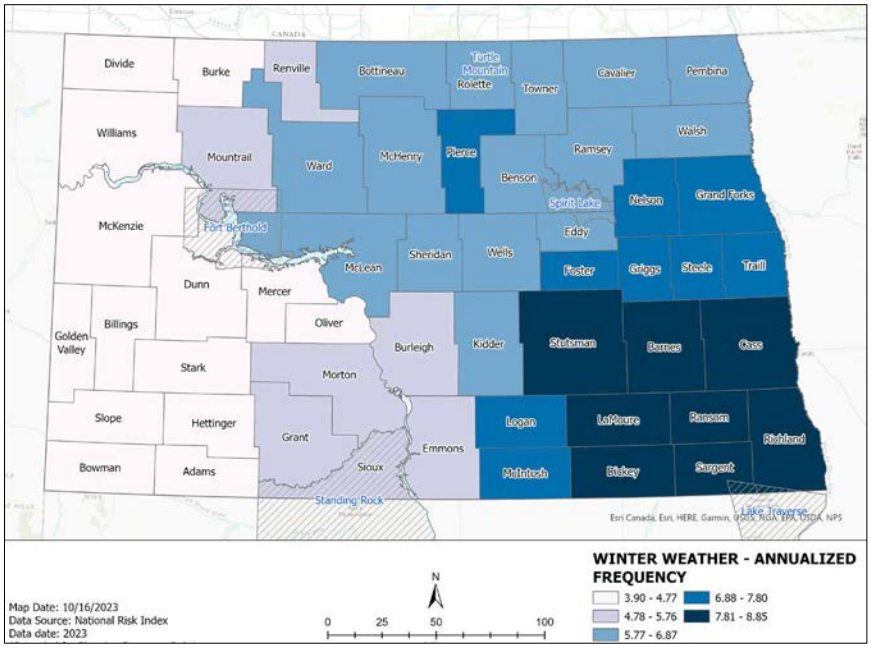
Figure 4.5-17: National Risk Index Annualized Cold Wave Event Days



Source: NRI, 2023

Figure 4.5-18 shows the probability of severe winter weather events, showing that in the western portion of the state, probability can be as low as 3.9 events per year (NRI, 2023). While in the southeast, the number of events is more than double that amount. Just as westerly winds are more likely to clear out dense cold air in the west, storm systems are more likely to linger in the east.

Figure 4.5-18: National Risk Index Annualized Severe Winter Event Days

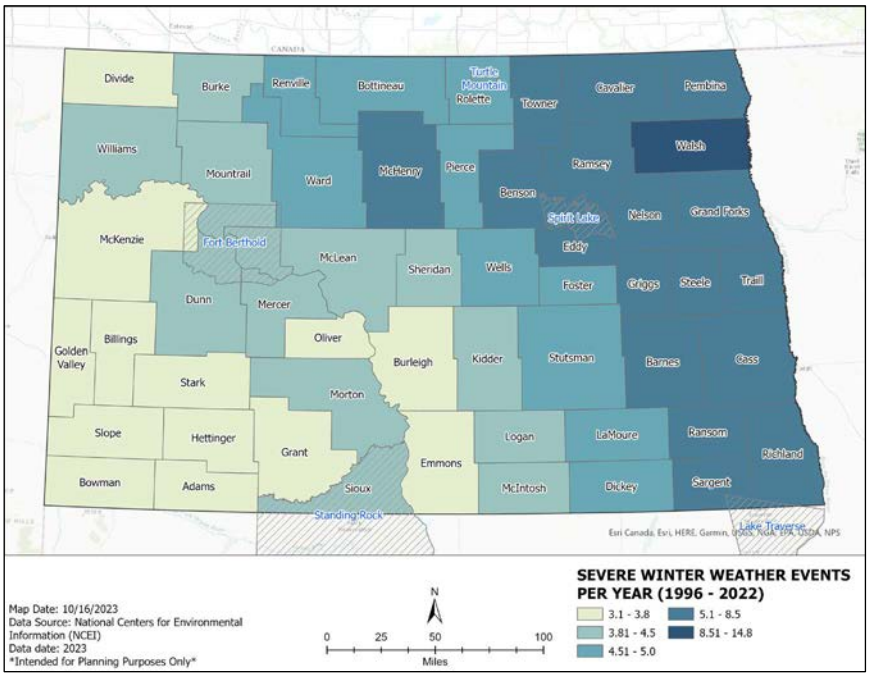


Source: NRI, 2023

Figure 4.5-19 uses the NCEI (2023) dataset to look at the collective probability of severe winter weather in any one year, since 1996. Again, certain Walsh County events are double counted in this database, but much of the Red River Valley has a similar risk of more than eight severe winter weather event days in a given year.

A further breakdown of the NCEI data, as shown in **Figure 4.5-20**, looks at the number of severe winter event days, per county scale, and per calendar year since 1996.

Figure 4.5-19: NOAA NCEI Severe Winter Weather Annualized Event Days

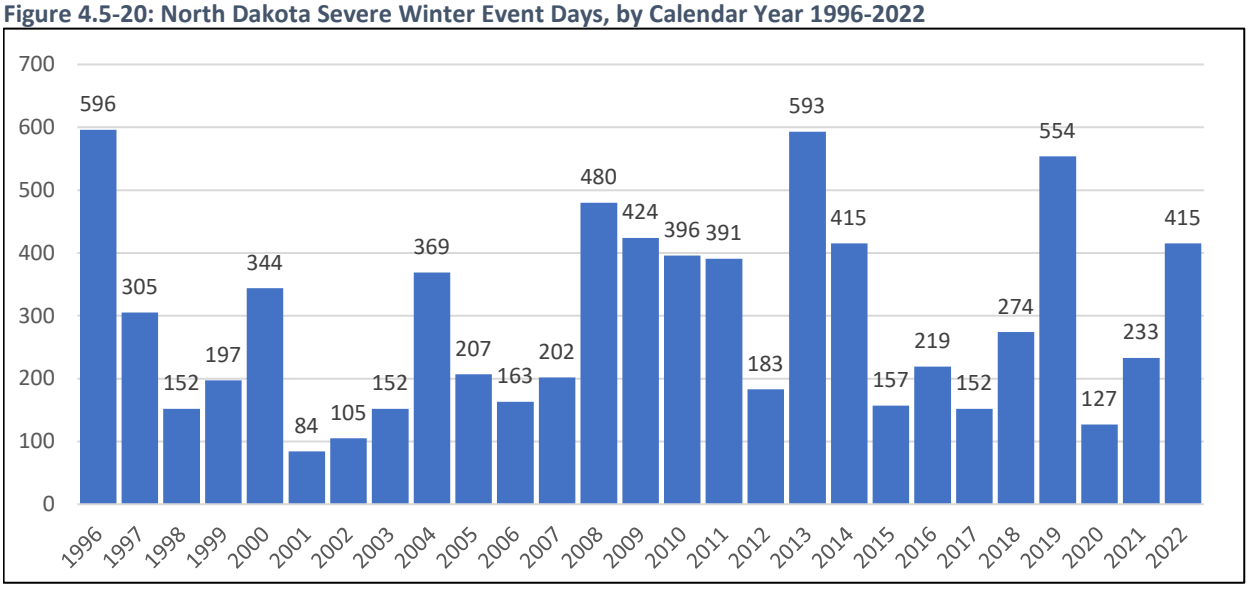


Source: NCEI, 2023

The worst calendar year winter periods were in 1996 (596), 2013 (593) and 2019 (554). The state has averaged 303.4 events per year during the life of the database, but there is an increase in severe weather over that average during the 2008 to 2017 period, when the average was 341.0 per year (NCEI, 2023). in the plan update period, the 2018 to 2022 average was 320.6, representing a slight decrease in severe winter weather from the previous 10-year average.

Figures 4.5-21, 4.5-22, 4.5-23, and **4.5-24** break down those winter events into the type of severe winter

Figure 4.5-20: North Dakota Severe Winter Event Days, by Calendar Year 1996-2022



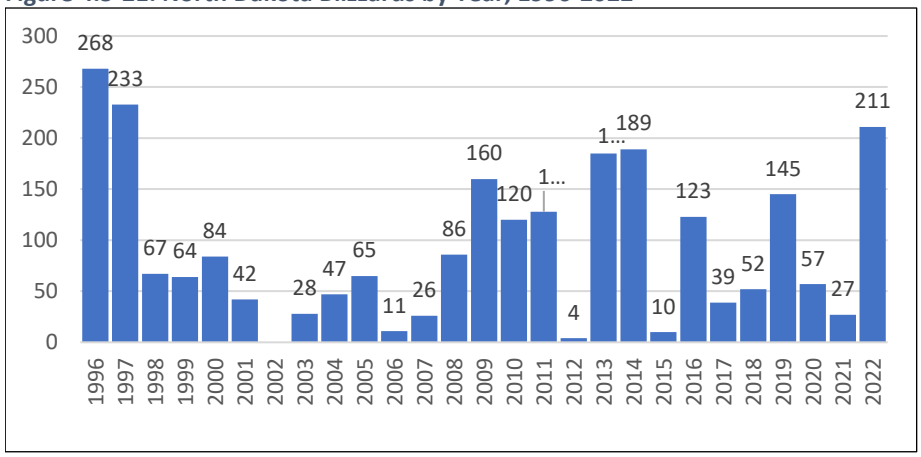
Source: NCEI, 2023

events experienced between 1996 and 2022 by the number of counties affected, according to the NCEI

database. Note that for episodes of heavy snow and ice there was generally less distinction between such storm event types in earlier years than in more recent years. Often the more generic category of winter storm was used when there was considerable spatial or temporal variation in conditions during the same storm episode.

Figure 4.5-21 shows blizzards in the state by calendar year for the 26-year period. The state averages 95.0 county scale blizzards per year. According to NCEI (2023), while the worst years for blizzards were in the 1990s, the 2018 to 2022 average is higher than the overall period at 98.4 blizzards per year.

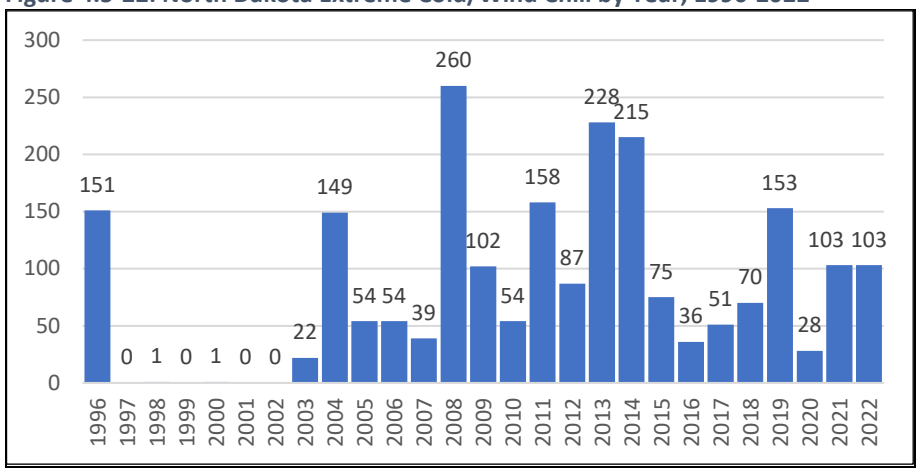
Figure 4.5-21: North Dakota Blizzards by Year, 1996-2022



Source: NCEI, 2023

Figure 4.5-22 displays data related to extreme cold and wind chill events in the state by year from 1996-2022. The state averages 82.8 county scale extreme cold and/or wind chill events per year. According to NCEI (2023), while the worst year for cold snaps was 2008 (260), the 2018 to 2022 average is higher than the overall period at 91.4 events per year.

Figure 4.5-22: North Dakota Extreme Cold/Wind Chill by Year, 1996-2022



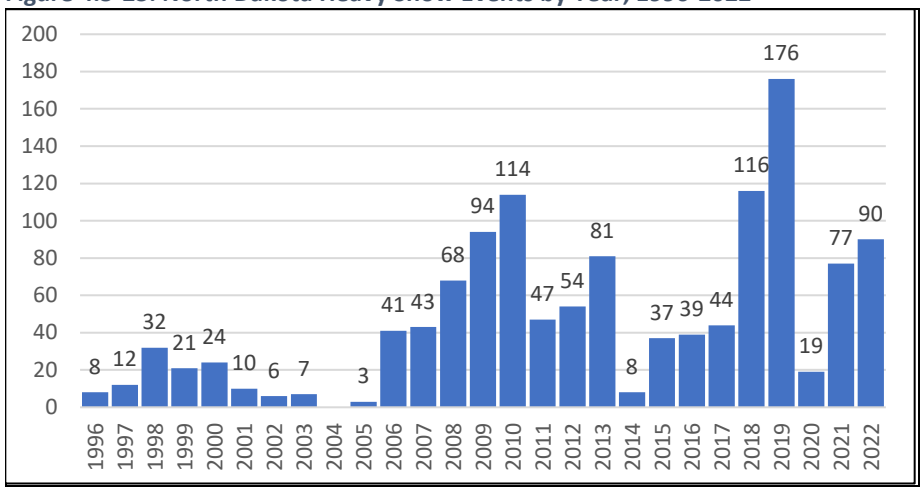
Source :NCEI, 2023

[Foster County residents] said that severe winter weather can result in the shutting down of roads, which can limit the ability to bring in food, fuel, and medical supplies, and can cause prolonged loss of power.

(Foster County Multi-Jurisdictional Hazard Mitigation Plan, 2021)

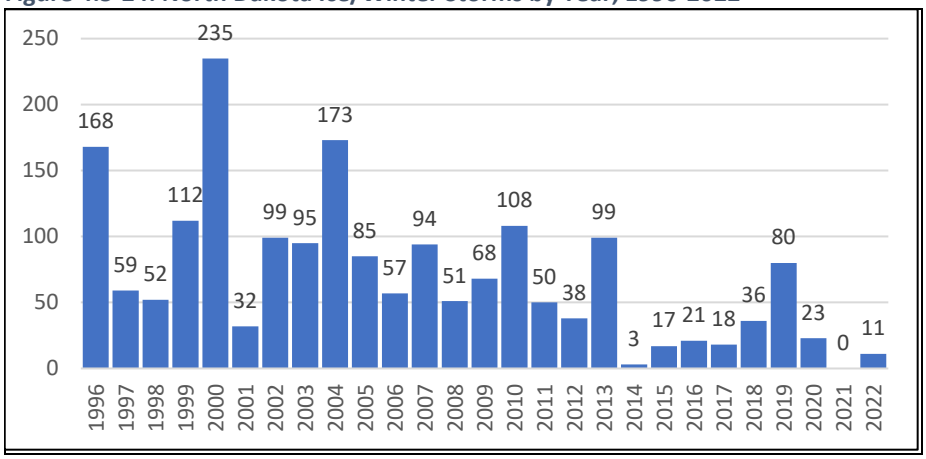
Figure 4.5-23 shows heavy snow events in North Dakota since 1996. The state averaged 48.9 county scale heavy snows per year. The worst year for heavy snow was in 2019 (176), and there has generally been an increased reporting of heavy snow events since about 2009. This corresponds to a decrease shown in Figure 4.5-24 of the category "Winter Storm". According to NCEI (2023), the average since 2018 is 95.6 events per year or about 4.5 times the pre-2009 number of events.

Figure 4.5-23: North Dakota Heavy Snow Events by Year, 1996-2022



Source: NCEI, 2023

Figure 4.5-24: North Dakota Ice/Winter Storms by Year, 1996-2022



Source: NCEI, 2023

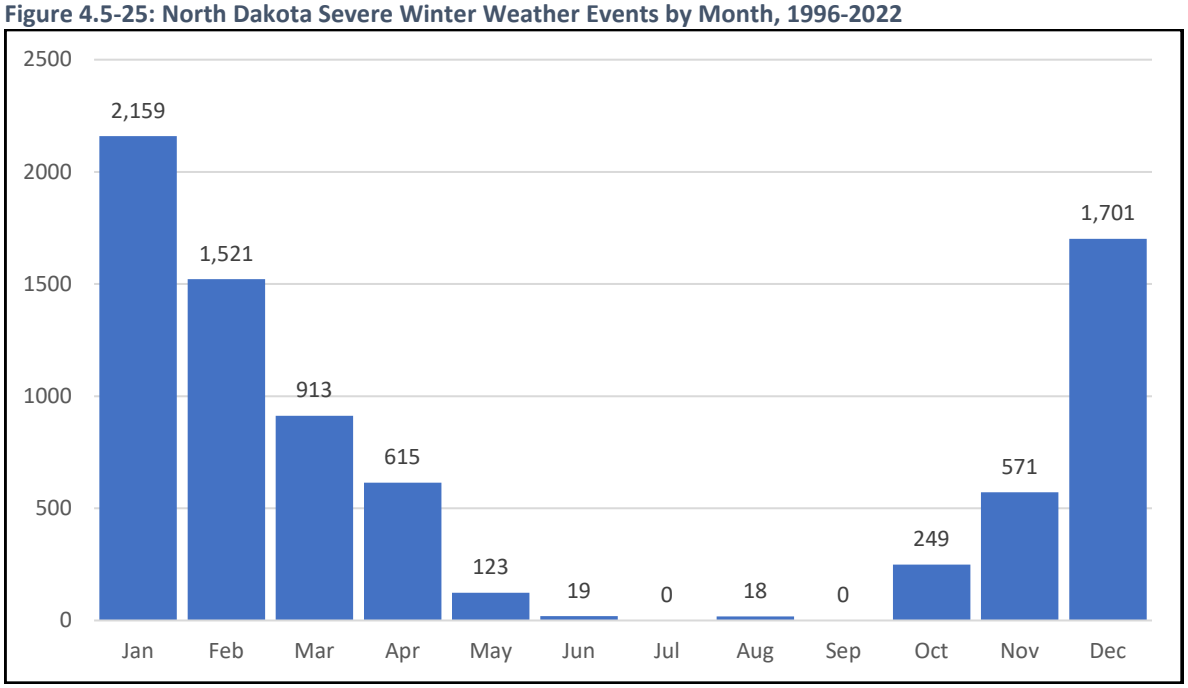
Figure 4.5-24 shows ice/winter storms in the state from 1996 to 2022. The state experienced 72.5 of these county scaled events per year during that period. For ice/winter storms in the year 2000, with 235 events, was the worst, and there is a substantial skew downward in events over time, mainly due to a change in preferred terminology, from the more generic Winter Storm to the more specific Heavy Snow event type. The plan update period average was 30 events and was skewed by 2019 with 80 events.

In Benson County, snow has fallen all months except June, July, and August. Given these facts, most people in the region expect winter conditions, and lifestyles.

(Benson County Multi-Jurisdictional Hazard Mitigation Plan, 2018)

Figure 4.5-25 shows the NCEI database (2023) of severe winter events from 1996 to 2022 as broken down by month and totaled for each county. Unsurprisingly, winter months are worse, but January (2,159 events) exceeds the next worst month (December, with 1,701 events) by 458 events, or by 14.7 events per day.

Figure 4.5-25: North Dakota Severe Winter Weather Events by Month, 1996-2022



Source: NCEI, 2023

Delivery of water to jurisdictions can be interrupted by water main breakage resulting from ground shifts during freeze and thaw cycles.
(Hettinger County Multi-Jurisdictional Hazard Mitigation Plan, 2019)

Figure 4.5-26 shows the county averaged probability of severe winter weather event days in North Dakota counties since 1996 using NCEI data. Blizzards are the most common, with a 95 percent probability of occurrence in at least one county each year. Winter storms (67.8 percent) and Extreme Cold/Wind Chill events (64.8 percent) each have more than 60 percent probability of occurrence in the state, each year. According to NCEI (2023), every type of event in the database has a probability in the state.

Figure 4.5-26: Probability of Severe Winter Weather Event Days since 1996

Type of Event	Probability
Blizzard	95.0 per year
Winter Storm	67.8 per year
Extreme Cold/Wind Chill	64.8 per year
Heavy Snow	48.9 per year
Cold/Wind Chill	19.2 per year
Ice Storm	4.6 per year
Frost/Freeze	2.8 per year
Freezing Fog	0.2 per year

Source: NCEI, 2023

4.5.1.5 Warning Time and Duration

When the NWS offices in Bismarck or Grand Forks, which serve North Dakota, determine there is a potential for dangerous and impactful winter conditions they issue watches, warnings, or advisories. The NWS issues winter storm watches, warnings or advisories based on specific criteria, as shown in **Figure 4.5-27**. The heavy snow criteria for a Winter Storm Warning across North Dakota are a minimum of 6 inches of snow in a 12 hour or less period of time, or for a minimum of 8 inches of snow in 24 hours (NWS, 2023). These criteria can be further adjusted by the NWS Bismarck or NWS Grand Forks offices, when needed, to address conditions that may represent a mix of dangerous winter conditions. When these severe winter weather alerts are issued by the NWS the Emergency Alert System (EAS) is activated and alert-specific information flows across the Weather Enterprise and to the public. Alerts may be received by the public through a variety of sources including NOAA Weather Radio broadcasts, broadcast media or internet media sources, and various types of alert apps.

Figure 4.5-27: NWS Winter Storm Products

Source: NWS, 2023

Most winter weather hazards accompany air mass changes that can move quickly through an area over a period of hours or a few days. Extreme cold and wind chill events can extend for many days as they are associated with intense high-pressure systems of Polar or Arctic origins that are typically hovering over Canadian land masses. Even for ice storms that quickly pass, problems can endure if temperatures hover below freezing. The persistent weight of ice or heavy snow can have cascading consequences that will be discussed below.

4.5.2 Consequence and Vulnerability Loss Analysis

This section describes the consequences and vulnerabilities of severe summer weather. Both consequences and vulnerability will be discussed in this section.

FEMA Emergency Management Institute (EMI) defines a consequence as the “degree of debilitating impact that would be caused by the incapacity or destruction of critical infrastructure or a critical function.” Consequences can be tangible impacts on buildings or systems or intangible impacts on process, business, or reputation. Consequences include debilitating impacts, such as the loss of critical functions, data, or the public. According to EMI (2023), it also includes cascading effects that may influence the functionality of critical services such as the loss of service of a utility or communications.

Vulnerability is “susceptibility to physical injury, harm, damage or economic loss.” It considers the extent of injury and damage that may result from a hazard event of a given intensity in a given area. According to EMI (2023), this may be a geographic, social, or economic feature that makes harm from a hazard more likely or more intense.

4.5.2.1 Human Loss

When the human body's core temperature sinks to about 95 degrees Fahrenheit, signs of hypothermia begin to exhibit themselves, as shown in **Figure 4.5-28**.

Figure 4.5-28: Warning Signs of Hypothermia

Source: NWS, 2023

Confusion, sleepiness, and stiff muscles are among the symptoms, and each can hamper one who is suffering from seeking assistance (NWS, 2023). According to NCEI data, there have been 10 deaths as a direct result of severe winter weather events in North Dakota between 1996 and 2023 (NCEI, 2023). All 10 deaths were directly linked to extreme cold/wind chill events and the majority of victims perished due to exposure and hypothermia.

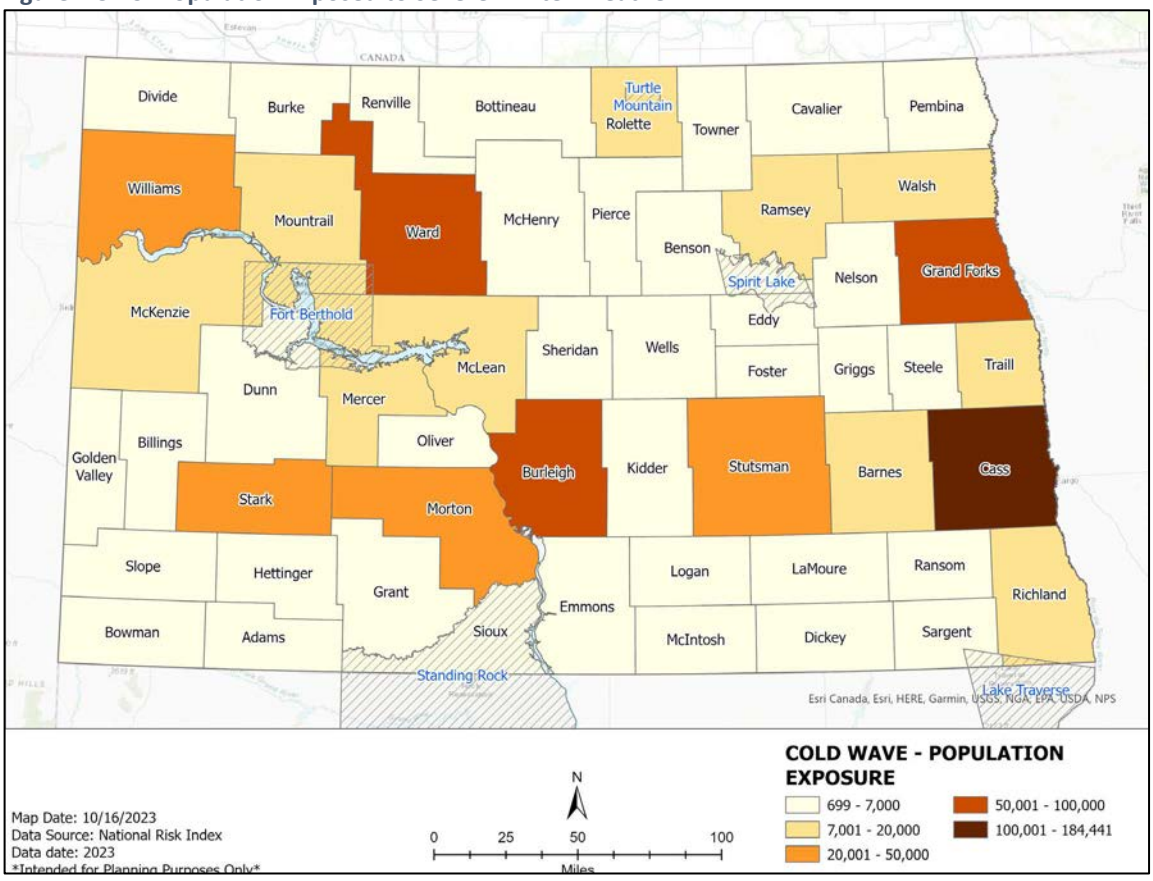
Due to limitations of NCEI storm reporting and coding, there have likely been many more deaths and injuries related to extreme winter weather events. For example, loss of power due to winter weather often forces residents to rely on generators or space heaters which can increase the risk of carbon monoxide poisoning.

Blowing snow resulting in road hazards was a commonly identified impact during planning committee meetings. Wind is particularly strong coming off Devils Lake.

(Spirit Lake Tribal Hazard Mitigation Plan, 2019)

Figure 4.5-29 is a map that shows the weighted risk of exposure to cold waves or severe winter weather. According to NRI (2023), as all people in North Dakota are subject to negative health impacts, frostbite and disease, anyone can be a victim of severe winter weather, every year.

Figure 4.5-29: Population Exposed to Severe Winter Weather



Source: NRI, 2023

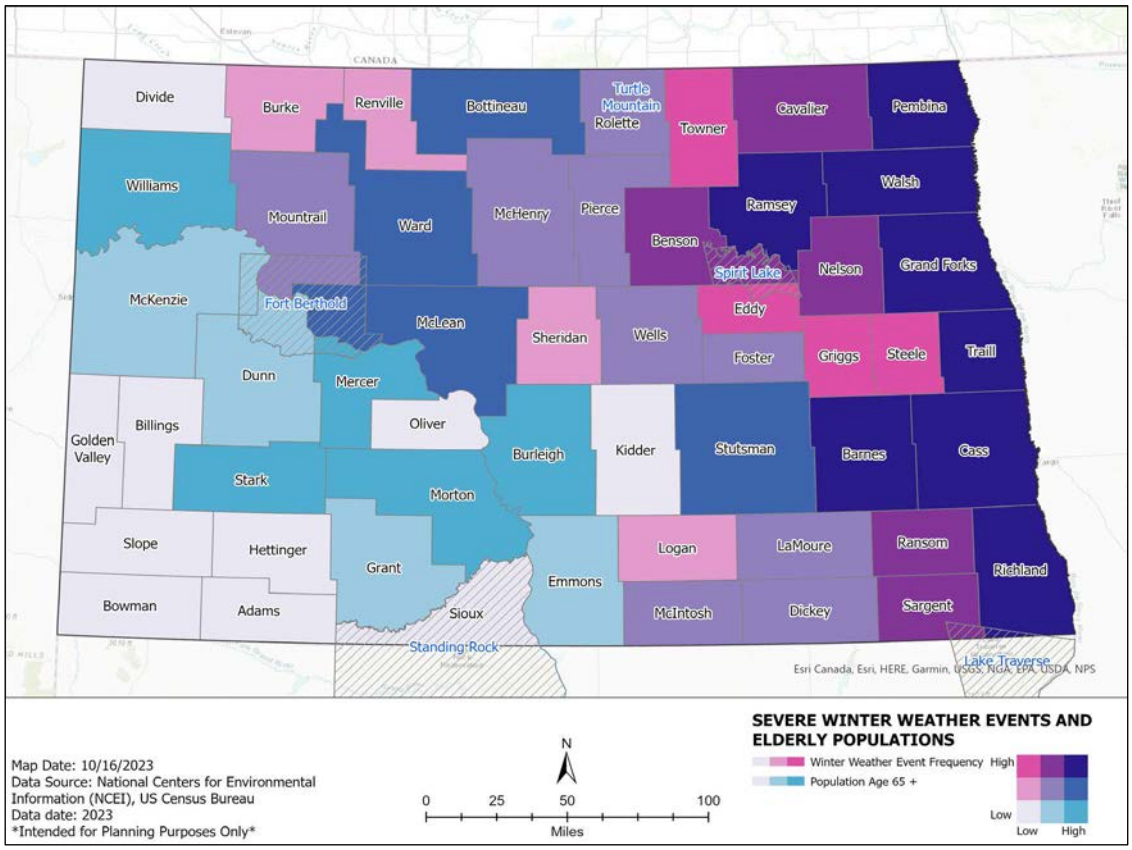
The human and financial consequences of severe winter weather are shown in **Figure 4.5-30**. As an event, blizzards (10) and cold/wind chill (8) have been the deadliest for North Dakota (NCEI, 2023). According to NCEI (2023), there have been 27 North Dakota deaths which were directly associated with severe winter weather and another 124 injuries between 1996 and 2022. Utilizing North Dakota Vital Records (2023), 126 North Dakotans died from freezing between 2008 and 2022 for an average of 10.5 each year. All human bodies are susceptible to harm from severe winter weather, some are more vulnerable than others. The elderly population is more sensitive to cold temperatures than younger adults. Hypothermia taxes the heart, kidney, and liver, which older people are less likely to be able to recover from (Centers for Disease Control and Prevention, 2021). **Figure 4.5-31** is a map showing where severe winter weather and elderly populations overlap (American Community Survey, 2023; NCEI, 2023). Though elderly populations are found throughout the state, there are significantly large pockets of the elderly throughout the state, particularly in small, rural communities that most often feel the effects of substantial winter events and potentially have difficulty meeting their basic needs on their own. Small rural communities often do not have the basic necessities available increasing the need for transportation.

Figure 4.5-30: Consequences of Severe Winter Weather in North Dakota, 1996-2022

Type of Event	Events	Deaths	Injuries	Property Damage	Crop Damage
Blizzard	2,471	10	98	$ 271,700,000	$ -
Winter Storm	1,764	5	21	$ 39,957,000	$ -
Extreme Cold/Wind Chill	1,684	2	0	$ -	$ -
Heavy Snow	1,271	0	0	$ 9,055,000	$ 400,000
Cold/Wind Chill	500	8	2	$ 360,000	$ 75,000
Ice Storm	120	0	0	$ 100,300,000	$ -
Frost/Freeze	73	1	3	$ 15,000	$ -
Freezing Fog	6	1	0	$ 385,000	$ -
Grand Total	**7,889**	**27**	**124**	**$ 421,772,000**	**$ 475,000**

Source: NCEI, 2023

Figure 4.5-31: Severe Winter Weather and Elderly Populations

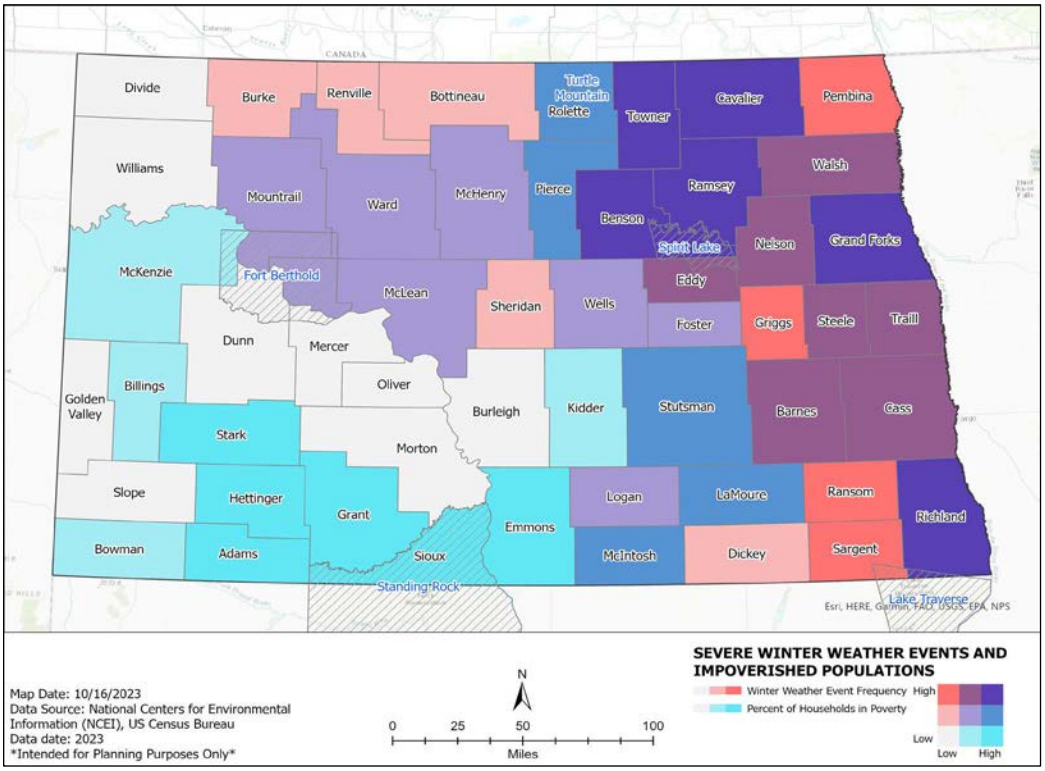


Source: NCEI, 2023; ACS, 2023

The chronically ill and asthmatics can struggle with extreme cold as well. Those relying on social services or trying to reduce electric bills by not using enough heat also can put themselves at risk. Social services may be difficult to reach during winter events, making households food insecure or otherwise struggling.

Figure 4.5-32 shows NCEI's severe winter events compared with poverty rates. In areas with many people in poverty, there may be more concerns with insufficient heat in the homes, drafty homes, and lack of access to medical care. These residents may also need access to heating centers and may not have the ability to travel to them (ACS, 2023; NCEI, 2023). Like concentrations of elderly populations, impoverished populations are more concentrated in the eastern portion of the state where more frequent winter events are reported.

Figure 4.5-32: Severe Winter Weather and Poverty



Source: NCEI, 2023; ACS, 2023

Median ages above 65 were reported in 190 North Dakota communities (ACS, 2022) with 19 communities reporting a median age exceeding 80. All of these communities reporting an above-80 median age were small rural communities, which leaves a heavy burden of snow clearance and emergency response on a small number of young people in the communities of Riverside Township (Steele), Greatstone Township (McLean), Illinois Township (Nelson), Michigan Township (Nelson), Denbigh Township (McHenry), Rifle Township (Hettinger), Casey Township (Ransom), Hillsboro Township (Traill), Mauch Township (Sheridan), Golden Valley Township (Williams), Soo Township (Burke), Albion Township (Dickey), Manfred Township (Wells), Divide Township (Dickey), Baden Township (Ward), Wiser Township (Cass), Richburg Township (Bottineau), West Adams Township (Adams), and Tepee Butte Township (Hettinger).

While there are denser concentrations of elderly populations in the eastern portion of the state, the western portion of the state is also experiencing the aging of populations and working to find solutions to provide access to- critical resources. Considering the lower amount of individuals living in the southwest portions of the state, these already small communities are experiencing the impacts of aging populations in their community regularly.

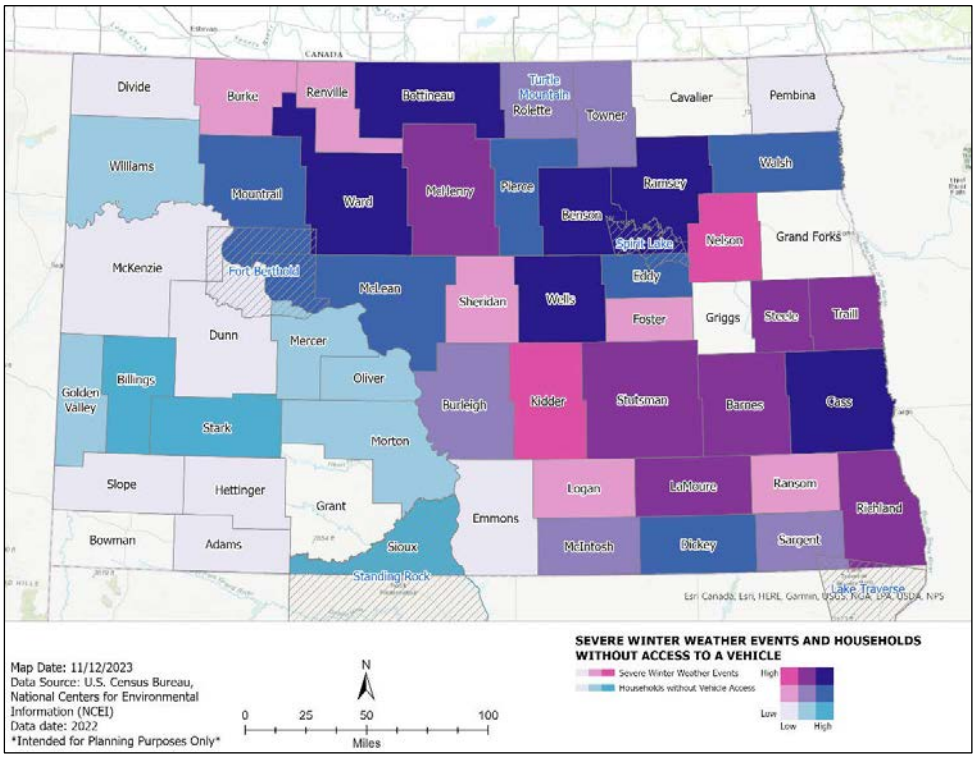
Figure 4.5-33: Point in Time Homeless Count

Year	Total Households		Total Persons	
	Sheltered	Unsheltered	Sheltered	Unsheltered
2023	465	165	608	176
2022	405	77	527	83
2021	344	70	474	74
2020	391	31	507	34
2019	408	6	545	12
2018	444	48	494	48

Source: North Dakota Continuum of Care, 2023

Those who are homeless, without vehicles or with unreliable vehicles have little mobility and risk exposure in winter. Even in areas with bus services, winter weather often leads to suspension of service for delays. **Figure 4.5-33** shows homelessness data for the state (North Dakota Continuum of Care, 2023). Homelessness data is collected in January when conditions are often bad (NCEI, 2023; HUD 2022). **Figure 4.5-34** displays data related to winter events and households without access to a vehicle. There are six communities in North Dakota with at least 50 percent of workers without access to a vehicle: Manitou Township (Mountrail), Kentner Township (Dickey), Green Township (Barnes), Andrews Township (McLean), Elverum Township (Pierce), and Cathay (Wells) (ACS, 2023).

Figure 4.5-34: Severe Winter Weather Events and Households without Access to a Vehicle



Source: NCEI, 2023; ACS, 2023

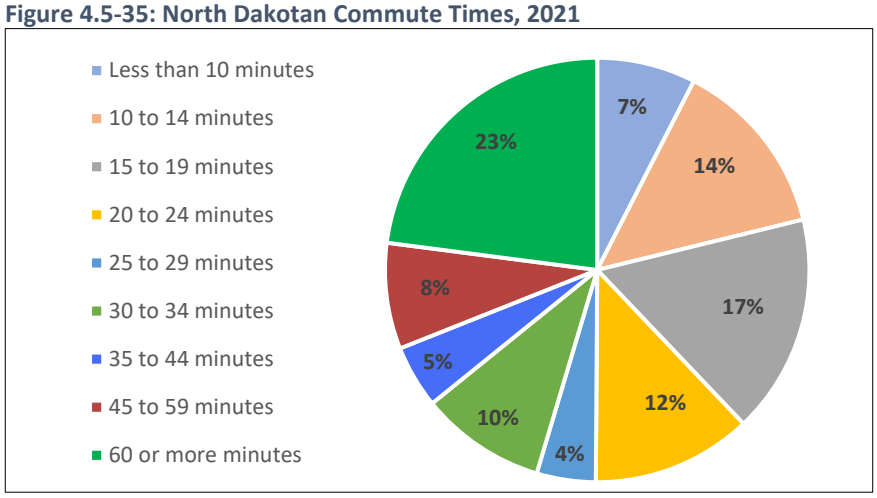
People who have lengthy commutes face longer periods of time on dangerous roads and risk becoming stranded.

Figures 4.5-35 and **4.5-36** show data related to commuting in North Dakota. **Figure 4.5-35** shows the commute times by time segment (ACS, 2023). More than an hour is the most common commute time in the state.

Figure 4.5-36 shows the aggregate commute time for each county compared with their respective severe winter weather risk (ACS, 2023, NCEI, 2023). This gives a more complete picture of where people live who may run the highest risk of commuting on icy roads, running the risk of colliding into one another.

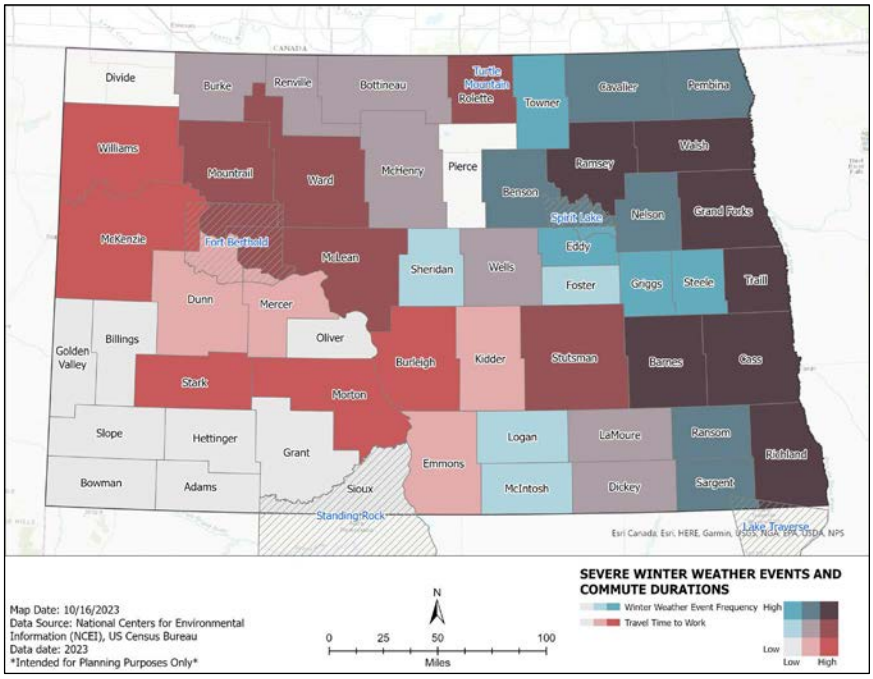
There is a direct correlation between the heavy winter events and the lengthening of commute times as shown in **Figure 4.5-35**, especially on the eastern border of the state. While state law requires that windshields be cleared of obstructions before taking the road so that visibility is not compromised, heavy snow can fall fast and accumulate on windshield edges, obscuring full views and decreasing safe travel. According to the National Highway Traffic Safety Administration (2023), during a lengthy commute this accumulation may become significant. More than 2,000 people die each year due to winter conditions on highways. North Dakotans in 47 communities have more than 50 percent of its workers commuting more than 1 hour (ACS, 2023). In 16 communities, 100 percent of commuters travel and hour or more to work: Sibley (Barnes), Otsby Township (Bottineau), Marion Township (Bowman), Troy Township (Divide), Columbia Township (Divide), Garner Township (Golden Valley), Merrill Township (Hettinger), Wagendorf Township (Hettinger), Walker Township (Hettinger), Land Township (McHenry), Keene Township

Figure 4.5-35: North Dakotan Commute Times, 2021



Source: 2021 American Community Survey, 2023

Figure 4.5-36: Severe Winter Weather and Aggregate Commute Time



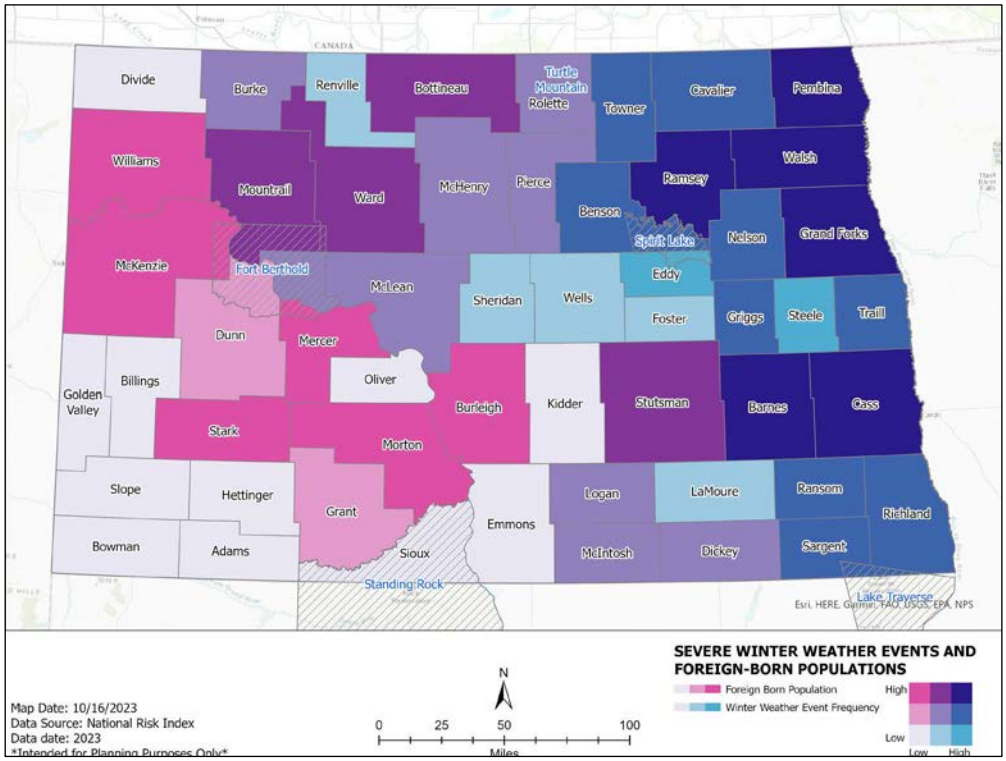
Source: NCEI, 2023; ACS, 2023

(McKenzie), Egan Township (Mountrail), Forde Township (Nelson), Westfield Township (Steele), Good Luck Township (Williams), and Grenora Township (Williams).

Transportation can be more challenging for those without access to a vehicle who must walk or wait for buses. Additionally, food supply programs such as senior meal delivery and senior center food distributions that are impacted by winter storms can pose a serious risk to elderly populations. Deliveries of home-heating fuel can be stalled by poor road conditions, creating a concern for households that rely on it for heat. These include more than 200 households in each of Fargo (Cass), Rugby (Pierce), East Morton Township (Morton), Beulah (Mercer), Hazen (Mercer), Turtle Mountain (Rolette) and Williston (Williams) (ACS, 2023).

Those who are new to North Dakota often come from countries where winter weather is not common, and they may not have experience with weatherizing their homes, operating space heaters or radiators safely, or dressing safely for the weather. English may not be their first language, so outreach to this group may need to be targeted. **Figure 4.5-37** displays data related to weather events and foreign-born populations. Communities in the state with 50 percent or more foreign-born residents are Rugh Township (Nelson), Lenton Township (Stutsman), and Grover Township (Renville) (ACS, 2023). This may even be a challenge for oil workers originating from Texas or Louisiana, who may have language challenges along with not having experience with winter temperatures. According to ACS (2023) and NCEI (2023), Walsh County has a high number of winter events and also has a significant foreign-born population. There were five communities in the state where more than 50 percent of the population lived in a different state the year prior to the 2021 survey (ACS, 2023): Chain Lakes Township (Ramsey), Eden Township (Walsh), Otis Township (McLean), Crystal Springs (Kidder), and Maza Township (Towner).

Figure 4.5-37: Severe Winter Weather and Foreign-Born Population



Source: NCEI, 2023; ACS, 2023

Many North Dakotans enjoy the luxury of having personal vehicles with garages to store them in. When thinking about those who do not have these resources and are not from here, they could experience great challenges accessing essential supplies and with social isolation. These populations may include disabled individuals, New Americans, the elderly, or simply those in very rural areas that are reliant of transportation. These barriers may place new challenges on those who may already be underserved or vulnerable. All North Dakotans experience extreme winter regardless of available Resources. *(Personal communications at public meetings, April 18, June 21, and November 9, 2023)*

Coping with winter weather also can create its own vulnerabilities. For families with school-aged children, there are new challenges for families who work out of their homes or those without the internet. School snow days now lead to remote learning, which can create the need for parental supervision during the workday and the need for household broadband internet. For homes reliant on space heaters to generate adequate heat, there is the risk of carbon monoxide poisoning or fires from their misuse.

Winter can create great consequences for vulnerable populations. The struggle to get to work, even for those who have cars, can be a question of prudence as it relates to personal safety. For those who live paycheck-to-paycheck, skipping a shift may not be a reasonable compromise. For essential workers, such as healthcare workers, first responders, and pharmacists the decision to go to work can impact others' safety. Winter can be isolating for those new to the area and for socially isolated retirees with people staying inside, usual social establishments closing to keep employees safe, and regular visitors choosing to avoid the risk from the weather.

Figure 4.5-38: Shoveling Tips

Source: NWS, 2023

Winter weather can bring challenges to everyday life as well. Seniors and the chronically ill may lack the physical endurance or capability to shovel snow or such exertion may push their limits and create serious health issues. **Figure 4.5-38** shows shoveling tips from NOAA NWS.

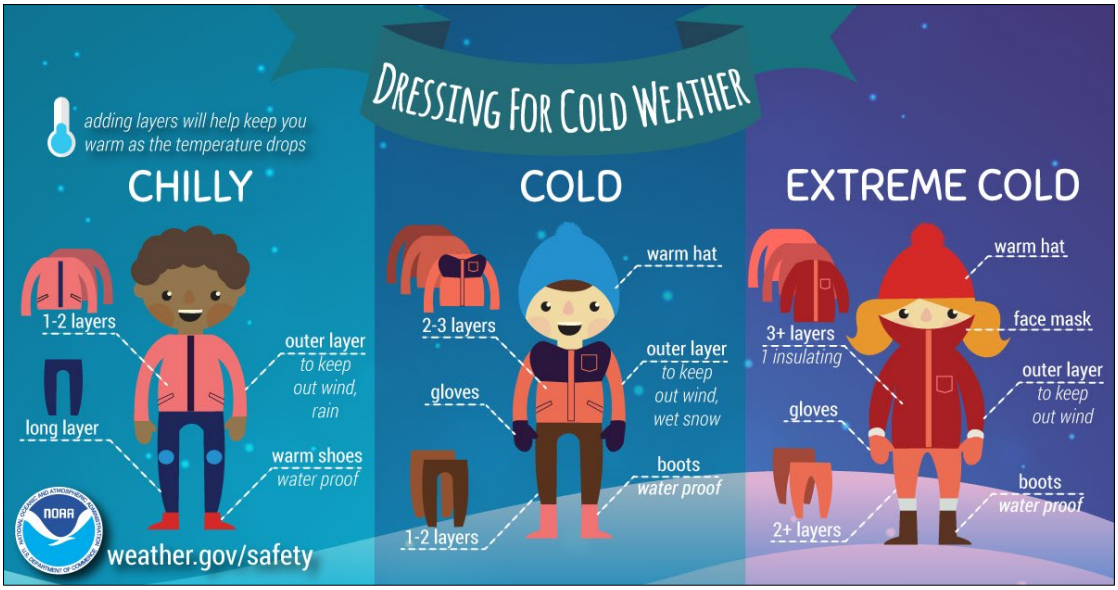
Figure 4.5-39 shows walking tips (The Ohio State University, 2020). Even walking can be challenging, especially for those who are unfamiliar with icy sidewalks. Walking like a penguin is encouraged on icy pathways. While North Dakota was not a reporting state, the Bureau of Labor Statistics reports that ice, sleet, and snow-related injuries in the workplace resulted in 1.8 per 10,000 workers missing at least one day from work in 2017, which was a low over time. Neighboring Montana (8.6) and nearby Wyoming (9.0) were among the top states (Bureau of Labor Statistics, 2019).

Figure 4.5-39: Winter Walking Tips

Source: The Ohio State University, 2020

Figure 4.5-40 shows cold-weather dressing tips, which can be a challenge to understand for those unfamiliar with truly cold winter weather, especially parents dressing their children for cold bus stops.

Figure 4.5-40: Winter Dressing Tips



Source: NWS, 2023

4.5.2.2 First Responders

While NWS watches, warnings and advisories may warn people about potentially dangerous travel conditions, first responders do not have the option to work from home or to respond "remotely." In fact, according to French (2021) and Urness (2023), calls for service generally increase in winter months, as slips and falls, car crashes, carbon monoxide issues and fires increase as people try to stay warm and still get around under adverse conditions.

Challenges exist in getting first responders to the scene of an emergency and their having usable gear upon arrival. The City of Bismarck brings snowplows into the mix, stationing them at strategically placed fire departments to facilitate a quicker overall response. They equip their apparatuses with tire chains and extra ice-melt product. They coordinate with Emergency Medical Services to keep ambulances in the firehouses so that they can safely respond behind snowplows and trucks. They also increase their on-site staffing. Still, winter response times are longer when compared to summer-time response (Craven, 2022). According to Berlinger (2021), water can freeze in the hoses, potentially rendering them useless to firefighters, and impacting their effectiveness in fighting winter fires.

Figure 4.5-41: Cass County Sheriff's Office Snowplow Enabled Response

Source: Cass County Sheriff's Office, 2023. Reproduced with permission.

Figure 4.5-41. According to Cass County Sheriff, Jesse Jahner, his department received funding for a V-plow snow blade and additional equipment for one of his department's pickups following a major 2019 blizzard (Haney, 2022). Blocked roads caused by that storm system delayed his deputies' response to several serious public safety calls. Several North Dakota counties, including both Cass and Grand Forks Counties (personal communications, November 2022), try to pair a county snowplow with an ambulance, and possibly a deputy, to ensure that first responders can get to any rural medical emergency quickly and safely, even in the middle of a storm.

State-level First Responders are in this severe winter weather mix as well. Most residents are familiar with the image of NDDOT snowplows clearing the state's highways, and some may have been involved in naming these machines (DeVries, 2023), since the naming program began in October of 2021. Likewise, residents are familiar with the shared roles of the ND Highway Patrol (NDHP) and NDDOT in monitoring road safety and closing down highways when conditions are impossible for safe travel. According to NDHP (2022), during the April 2022 blizzard, Highway Patrol officers also helped dispatchers get to and from work and helped deliver blood supplies to hospitals.

Yet most of these extraordinary winter storm operations go largely unnoticed, except for those who really need emergency service in the midst of the storm. According to NDDES staff (2023), North Dakota snowplow driver Ed Nelson received the Safety Council Life Saving Award for plowing the road ahead of an ambulance so that a person having a heart attack could reach the hospital in Williston and survive.

4.5.2.3 Environmental, Natural, and Cultural Resources

The weight of accumulating ice and snow and the force of the freeze-thaw cycle are two of the greatest risks to the environment and to natural and cultural resources. Weight, freezing, and thawing can lead to cracks in a variety of soil, rock, and even concrete surfaces (GLISA, 2023) and can cause impacts to roads, trails, recreational paths, and geologic features. Iced-over waterways create tempting surfaces for ice-fishing, skiing, skating, walking, and snowmobiling, but ice thickness can be difficult to judge. **Figure 4.5-42** shows the minimal thickness needed to support recreation activities on ice (NWS, 2023). Ice must be a foot thick to support most pick-up trucks, and ice less than 2 inches is not even safe for walking.

Figure 4.5-42: Minimum Ice Thickness for Safety

Source: NWS, 2023

Many museums or other cultural buildings are run by volunteers and may have temporary hours during the winter months, leaving roofs unattended, and subject to collapse (Henson, 2023). The lack of observation can also lead to the freezing of unattended water leaks or the bursting of water pipes, either one possibly causing significant damage. An accumulation of 3 feet of snow led to a roof collapse in Forman. There, the Sargent County Museum suffered damage to antique tractors and farm machinery as shown in **Figure 4.5-43**. According to Henson (2023), the local Bobcat manufacturing plant paid employees to help pull the county artifacts from the rubble, saving the volunteer-run museum more than $20,000. While insurance covered repairs to the building, much of the artifact restoration was conducted by volunteers, and some relics were unable to be restored. Snow and old newspapers don't mix well, and that section was lost for good.

Figure 4.5-43: Sargent County Museum after Roof Collapse

Source: Matt Henson, WDAY-TV, 2023. Reprinted with permission.

4.5.2.4 Property, Facilities, and Infrastructure Damage

Homes and private property are no different than museums and cultural institutions in that if they are not properly winterized or are left unattended there can be significant damage. **Figure 4.5-44** provides tips for weathering a home for winter. It is often the areas of the home that are not lived in that pose the greatest risk to the property. Chimneys, attics, and gutters can collapse from heavy ice and snow accumulations. Attics that are not sealed can let in blown snow and generate mold. Brick or masonry chimneys are particularly at risk of cracking from the freeze-thaw cycle. Insulating the attic and caulking or stripping windows and doors can reduce energy bills in the winter as well. According to the NWS (2023), elderly and low-income neighbors may need help from neighbors to check on these areas or acquire winterizing material.

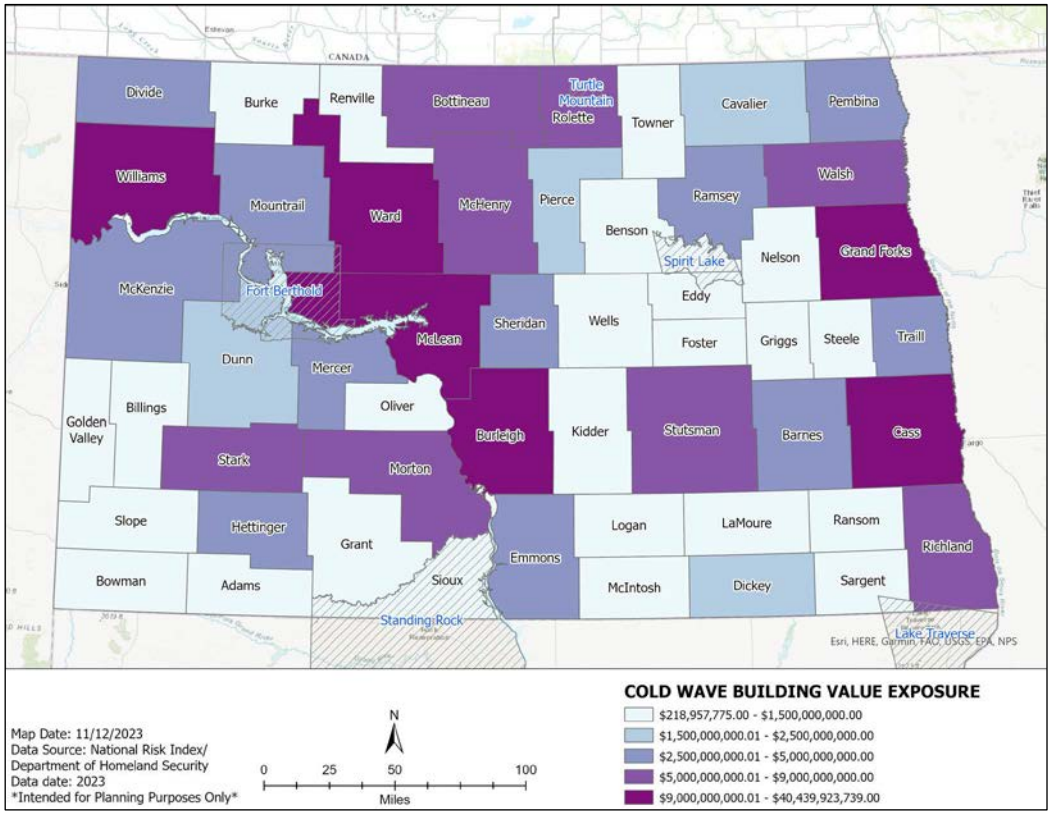
Figure 4.5-44: Winter Property Weathering Tips

Source: NWS, 2023

A small but growing number of North Dakotans migrate southward for winter to avoid the harsh conditions, living in the state as part-time residents. While this behavior was once the domain of retirees, remote work increases the accessibility of this type of lifestyle. In 2014, using rural newspaper subscriber data, that figure was about 1 percent of residents of both Dakotas. According to Marttila-Losure (2014), these residents often have neighbors or others checking on their homes in their absence, but especially during severe winter weather, those observations may not be frequent enough to avoid trouble.

Figure 4.5-45 shows the potential building value exposure by county for severe winter weather or cold waves as represented in the NRI. According to NRI (2023), urbanized areas and the middle Missouri River have the most exposure.

Figure 4.5-45: Building Exposure by County



Source: NRI, 2023

Infrastructure failure during severe winter weather can lead to cascading impacts on humans and property. Wind, blowing snow and ice can apply weight to electrical structures and communication infrastructure. Due to persistent cold temperatures, the additional weight from ice can persist, weighing down power lines, poles, and towers until they snap as previously seen in Figure 4.5-9, above. Downed trees also can take power lines with them on the way down. Telephone and cable lines face the same wrath. Even cell towers and street signs can bend and break in the face of heavy snow and ice. Unsafe travel, under the conditions that caused the damage, also delays repairs as road closures, obstructions and high winds can keep crews from responding.

In 2022, FEMA Public Assistance funds were distributed to state utilities to recuperate from the April-May 2022 storms. $1.7 million went to McKenzie Electric Cooperative to recuperate from 176 replaced power poles and 765 leaning power poles. According to FEMA (2023), for the same storm, Verendrye Electric Cooperative received $1.4 million to help replace more than 450 power structures across seven counties.

Electric generation can be impacted by severe winter weather as well. Hydropower from the Garrison Dam can be slowed by ice accumulation. Wind generation can be hampered or stalled by icy conditions, snow weight or high winds. Turbine blades can accumulate up to a foot of ice, and while that will not hurt the blade physically, it does impact the long-term efficiency of the turbine, disrupting energy production of up to 80 percent, and creating more friction that leads to wear. Most turbines are equipped with a set of cold-weather features that include de-icing lubricants and warmers. However, the coldest days on the prairie may cause operators to limit operations. The operating range of turbines is between -4 degrees Fahrenheit and 104 degrees Fahrenheit. According to Browne (2021), Gao, et. al, (2020), and Hashemi (2020), when wind speeds exceed 55 miles per hour, turbines cease operations for safety reasons.

Tips for staying warm and safe in a power outage are shown in **Figures 4.5-46** and **4.5-47**. Power outages can particularly lead to cascading issues. Persistent power outages can affect other infrastructure such as water treatment, wastewater treatment, or water pumps in wells. Persistent outages are likely in North Dakota winters, due to the inability to immediately respond to all issues, unlike in other seasons where poor weather conditions and slick roads are more temporary. To overcome the challenges of living without electricity many homes will turn to generators which can be a source of carbon monoxide poisoning.

Figure 4.5-46: Power Outage Tips

Source: NWS, 2023

Figure 4.5-47: Tips for Staying Warm in an Outage

Source: NWS, 2023

School buses also use the county radio system which is critical for the safety of children being transported to and from school especially in winter months when extreme cold or hampered visibility conditions exist. If a school bus breaks down or becomes stuck in a blocked road or goes off the road the county radio system is used to call for assistance.
(Renville County Multi-Jurisdictional Hazard Mitigation Plan, 2017)

Transportation and transport related economies struggle with bitter cold winter temperatures and the seasonal freeze-thaw cycles. During the spring, pavement is often in a fully saturated state and the ground below it is soft. At this critical time, heavy weight can cause potholes and cracks in the road that can lead to accidents and property damage. Seventeen U.S. states and many Canadian provinces adopt seasonal load restriction, or frost laws (Kirby, 2024), including North Dakota. NDDOT adopts Spring Load Restrictions which limit loads to 105,500 pounds gross weight to help preserve the roads from damage during this most critical freeze-thaw cycle. Restrictions are removed when water has drained and there is no risk for eminent freeze-thaw cycle repeats (Ovik, Siekmeier, and Van Deusen, 2000). **Figure 4.5-48** displays data about spring load restrictions on North Dakota Highways from 1993 to 2022.

Figure 4.5-48: Spring Road Restriction Days on North Dakota Highways

Year	Days Restricted	Notes	Year	Days Restricted	Notes
1993	65		**2008**	305	Most unrest. after 74
1994	71		**2009**	288	Most unrest. after 72
1995	105		**2010**	301	Most unrest. after 83
1996	312		**2011**	296	Most unrest. after 95
1997	84		**2012**	328	Most unrest. after 83
1998	221	Most unrest. after 95	**2013**	302	Most unrest. after 98
1999	144	Most unrest. after 88	**2014**	295	Most unrest. after 83
2000	152	Most unrest. after 77	**2015**	322	Most unrest. after 117
2001	123	Most unrest. after 84	**2016**	314	Most unrest. after 74
2002	110	Most unrest. after 104	**2017**	313	Most unrest. after 112
2003	83	Most unrest. after 69	**2018**	306	Most unrest. after 117
2004	103	Most unrest. after 82	**2019**	286	Most unrest. after 77
2005	96	Most unrest. after 83	**2020**	34	Lifted for Covid-19
2006	84	Most unrest. after 70	**2021**	298	Most unrest. after 72
2007	77	Most unrest. after 74	**2022**	303	Most unrest after 77

Source: North Dakota Department of Transportation, 2023

During that 30-year period, the average number of load-restriction days was 204. This is short when compared to the plan update period of 245.4 days between 2018 and 2022 (NDDOT, 2023). During severe winter weather, NDDOT sets clear priorities to first clear a lane for emergency travel, then to return and widen the lanes for regular travel.

4.5.2.5 Critical Facilities, Community Lifelines, and State Assets

North Dakota has some of the longest and harshest winters in the country (NCEI, 2023), and most health care facilities are designed, equipped, and staffed with that in mind. However, the winter season still adds a substantial additional burden to the normal operational load of these facilities, and the extremes of winter can threaten to overwhelm an otherwise taxed facility or asset. Healthcare facilities often need to respond to additional calls for response that occur during winter weather, as well as the slips, trips and falls that don't result in 9-1-1 calls.

During the Covid-19 pandemic, hospitals were needed at full capacity and exceeding capacity at times when winter weather was at its harshest. A hospital is like any other structure, it has a roof that may collapse, pipes that can freeze and rupture, air drafts that find their way into old buildings and sidewalks and parking lots that get slippery in icy conditions.

Figure 4.5-49: Minot hospital removing snow.

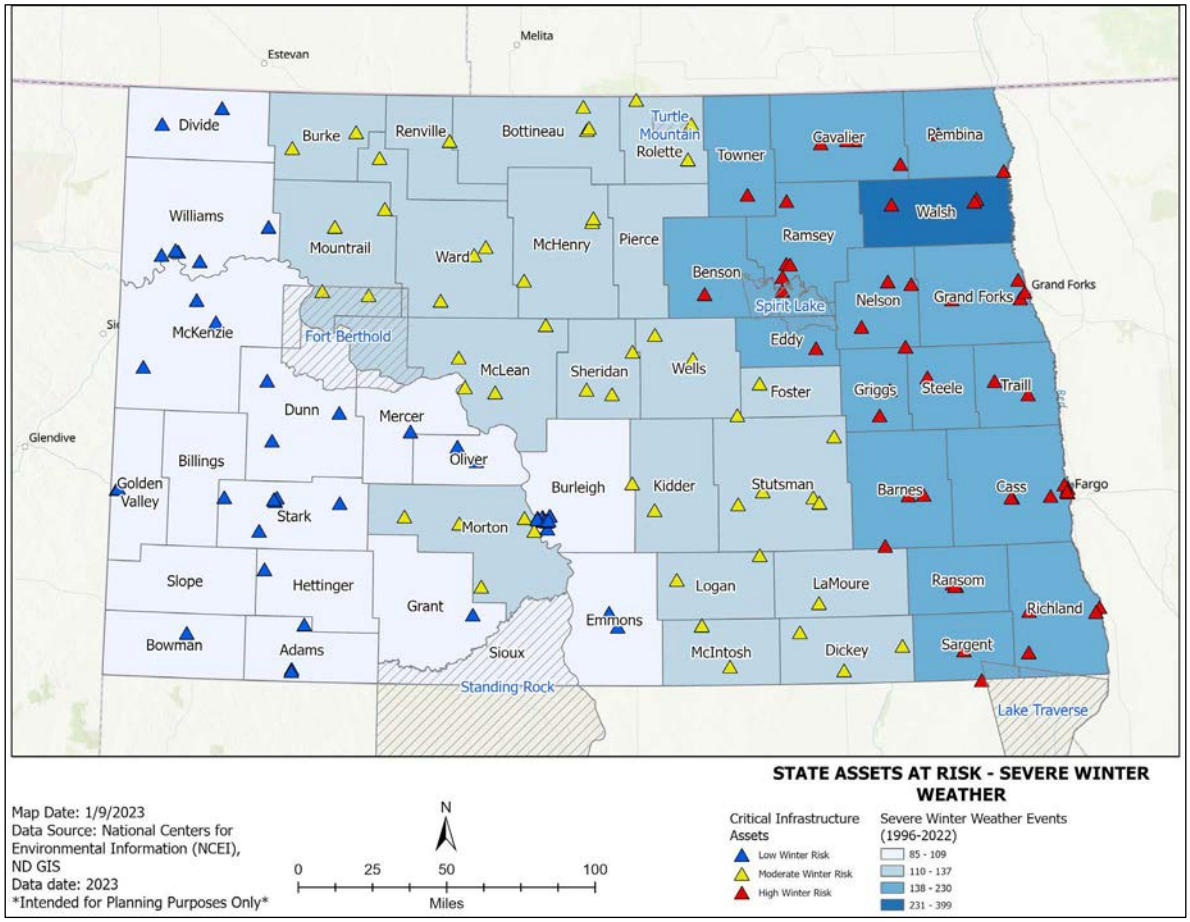
Source: Jill Schramm, Minot Daily News, 2021. Reprinted with permission.

As **Figure 4.5-49** suggests, hospitals located in areas prone to cold-weather have found it difficult to obtain enough snow-melt products during the snowiest of winters when demand often exceeds supply. Putting plastic sheeting on glass and keeping more internal doors closed to reduce cold-air intrusion are just some ways hospitals fight to keep their facilities operational, comfortable, and free from creating additional emergency room trips on their campus. According to Schrag (2015), getting employees to work is another challenge that many healthcare systems meet by chartering buses or vans to employee pick-up points around the area or having 4-wheel-drive vehicles go door-to-door to pick up staff.

Older hospitals and other critical facilities are particularly vulnerable. This includes older firehouses, older water treatment plants – anywhere where there are water pipes and a roof that can fail. Taller structures may have more vulnerable roofs, especially as conditions persist. They may need cranes to help clear snow from roofs, and high winds and deep snow may delay this critical aid.

Figure 4.5-50 shows the relationship between severe winter weather events as classified by the NCEI (2023), and the location of state assets. Counties with 137 or more events are at high risk for severe winter weather based off the regularity of past events. Much of eastern North Dakota falls in this area of increased risk, placing 222 state assets at risk for an insured value of $249,433,441 (NDFTF, 2023). Those buildings in the area of high risk include 201 government structures, many of which are educational buildings, 10 communication assets, nine agricultural and one chemical.

Figure 4.5-50: Severe Winter Events and State Assets.



Source: NCEI, NDGIS, 2023

4.5.2.6 State Economy and Economic Disruption

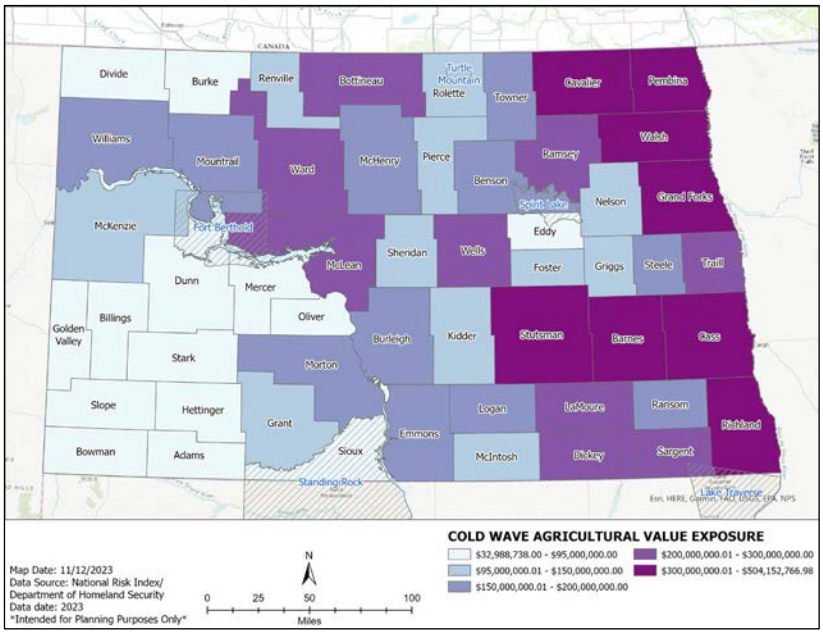
While any small business can be impacted by the lack of customer traffic and any damage to the property from which it operates, the large industries of agriculture and oil and gas are industries that have a significant environmental footprint and thus can be easily impacted by severe winter weather. Other industries, such as logistics and manufacturing may experience delays and damage from icy roads, but this section will focus largely on the impacts to North Dakota's two most critical industries, agriculture, and livestock.

Impacts to Agriculture.
Agriculture is the cultivation or rearing of living things, and just like human bodies, livestock and crops can struggle with extremely cold temperatures, ice, and snow. **Figure 4.5-51** shows the difference between a frost and a freeze, which can have significant impacts on unharvested crops, especially if cooler temperatures arrive earlier in the fall than expected. Similarly, a return of colder weather in the spring after seeds have been planted can result in a loss of those seeds. According to the NWS (2023), temperatures below 36 degrees Fahrenheit can impact many annual plants and crops, while temperatures at or below 28 degrees Fahrenheit will kill all but the heartiest of annual plants and crops.

Figure 4.5-51: Freeze vs. Frost

Source: NWS, 2023

Figure 4.5-52: Agricultural Exposure to Severe Winter Weather



Source: NRI, 2023

Figure 4.5-52 shows the agricultural value exposure to cold waves and severe winter weather as reported by FEMA's NRI (FEMA NRI, 2023). The high value of cattle is demonstrated by the high values assigned to cattle-producing areas. Locations like Ward and McHenry Counties are subject to more severe winter events and thus ranchers and farmers in these areas may be more vulnerable than in other parts of the state, but poor winter weather occurs everywhere in the state.

Impacts to Crops.

The following figures relate to actual crop losses experienced since the last plan update.

Figure 4.5-53 looks at the United States Department of Agriculture Risk Management Agency's (USDA RMA) indemnity amounts for crop insurance by crop.

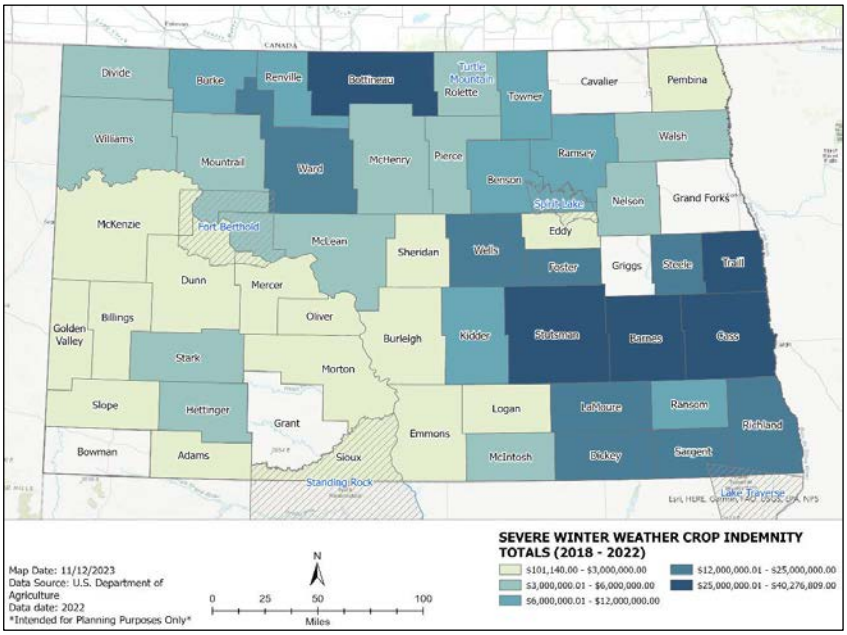
Figure 4.5-54 is a map looking at the same indemnity data by county instead of commodity. According to the USDA RMA (2023), corn was the top commodity to be lost to severe winter weather, losing almost $40 million a year, more than soybeans ($23 million) and wheat ($11.8 million) combined.

Figure 4.5-53: USDA Crop Insurance Indemnity Amounts for Severe Winter Weather by Commodity, 2018-2022

Commodity	Indemnity Amount	Annualized
Corn	$ 199,882,594.90	$ 39,976,518.98
Soybeans	$ 115,819,247.36	$ 23,163,849.47
Wheat	$ 59,175,872.78	$ 11,835,174.56
Canola	$ 16,177,988.96	$ 3,235,597.79
Dry Beans	$ 32,362,982.29	$ 6,472,596.46
Dry Peas	$ 3,002,041.54	$ 600,408.31
Sunflowers	$ 6,351,014.51	$ 1,270,202.90
Sugar Beets	$ 19,119,830.79	$ 3,823,966.16
Barley	$ 2,540,709.10	$ 508,141.82
Potatoes	$ 11,703,204.60	$ 2,340,640.92
Flax	$ 3,492,971.04	$ 698,594.21
Oats	$ 424,836.60	$ 84,967.32
Forage Product	$ 336,099.76	$ 67,219.95
Rye	$ 475,467.50	$ 95,093.50
Buckwheat	$ 33,680.75	$ 6,736.15
Mustard	$ 194,863.30	$ 38,972.66
Forage Seeding	$ 301,814.60	$ 60,362.92
Safflower	$ 55,385.00	$ 11,077.00
All Other Crops	$ 2,448,431.25	$ 489,686.25

Source: U.S. Department of Agriculture Risk Management Agency, 2023

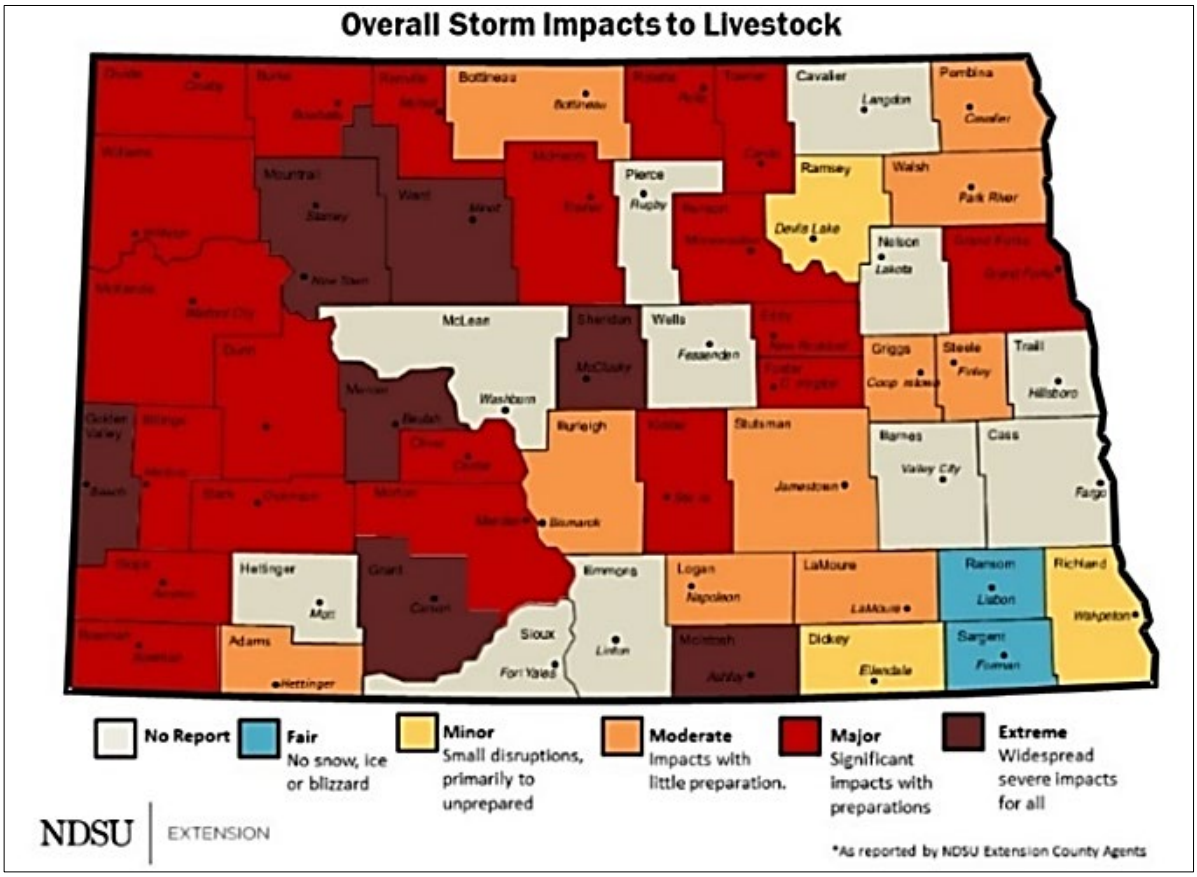
Figure 4.5-54: USDA Crop Insurance Indemnity Amounts for Severe Winter Weather by County, 2018-2022



Source: U.S. Department of Agriculture Risk Management Agency, 2023

Impacts to Livestock. In April 2022, two winter storms hit during livestock calving season leading to significant livestock losses. In response, the USDA increased its indemnity rates for beef calves from $175.27 to $474.38. As of January 2023, 1,982 North Dakota ranchers had applied for aid, with 362 applications gaining approval for a total of $2.8 million. Producers in 41 North Dakota counties reported problems, as shown in **Figure 4.5-55.** According to the North Dakota State University (NDSU) Extension (2023), in seven counties (Golden Valley, Mountrail, Ward, Mercer, Sheridan, Grant, and McIntosh) impacts were described as extreme and widespread, which likely had ripple effects in the local economies of these counties, especially those that were highly agricultural such as McIntosh, Golden Valley, Sheridan and Grant.

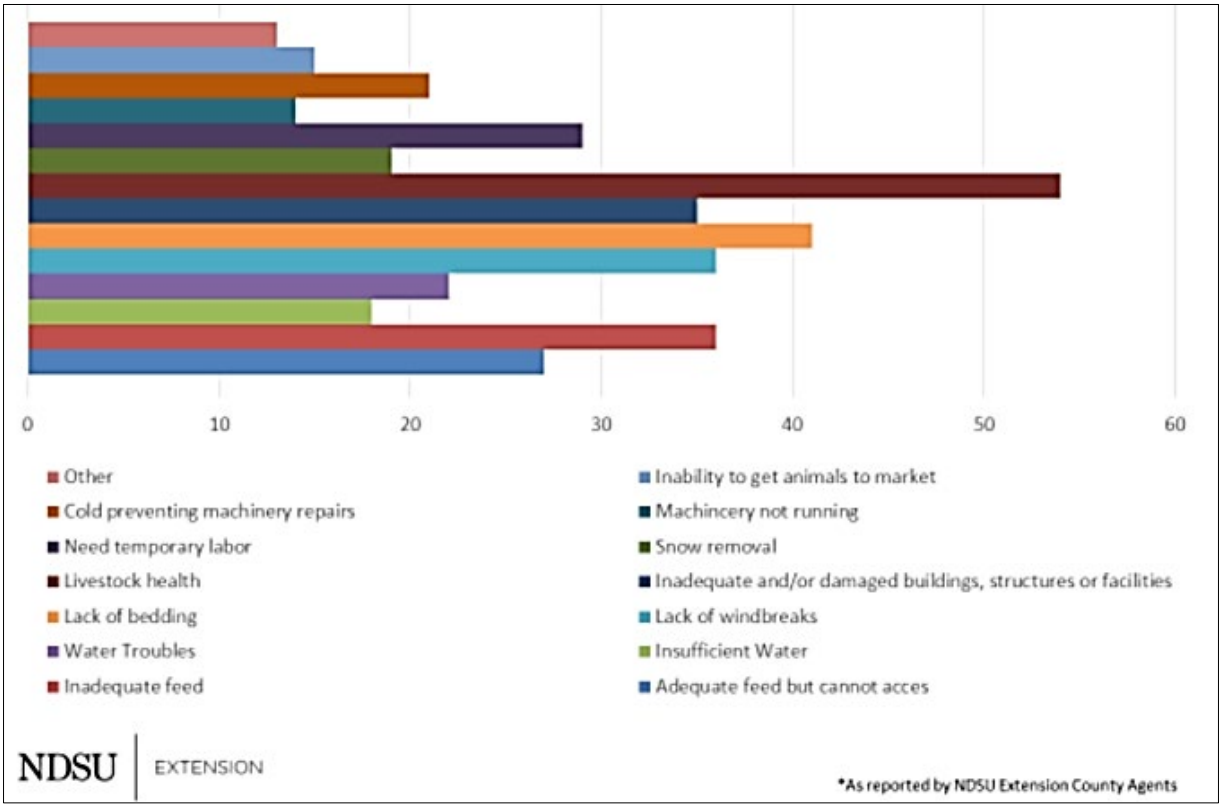
Figure 4.5-55: April 2022 Storm Livestock Challenges



Source: NDSU Extension, 2023

Excess mortality was not the only concern for ranchers and other livestock producers, as shown in **Figure 4.5-56**. Livestock health was a concern for over half of those reporting issues to NDSU Extension agents. According to the NDSU Extension, more than a third reported concerns about adequate bedding and feed, and damaged or inadequate structures to house animals.

Figure 4.5-56: April 2022 Storm Livestock Challenges



Source: NDSU Extension, 2023

Cattle thrive in temperatures between 40 degrees Fahrenheit and 90 degrees Fahrenheit, and for temperatures above and below that, they require additional feed and windbreaks or shelter to help them survive the elements (NDSU Extension, 2021).

As **Figure 4.5-57** shows, newborn calves may also need bedding and warming devices to survive North Dakota winters. Cattle, sheep, chickens, and horses are also subject to hypothermia and frostbite. According to Tobin and Hoppe (2022), frostbite to the extremities can impact testicles and udders in cattle which can affect the long-term vitality of the herd.

Figure 4.5-57: Cows and Calf in April 2022 Blizzard

Source: NWS, 2022

Impacts to Oil and Gas.

Figure 4.5-58: ND Oil well in the snow

Source: Michael Anthony, KFYRTV, 2022. Reprinted with permission.

The oil and gas industry can largely withstand severe winter weather if prepared. And while Texas and Louisiana oil and gas fields may be largely snow free and ill equipped to handle extreme cold or severe winter storms, such as the Texas Deep Freeze of February 2021, places like Alaska, Russia, Norway, and North Dakota are all able to produce significant amount of petroleum product under the harshest of winter conditions (Hilbert and Hallai, 2021). In cold weather climate regimes, like that experienced in North Dakota's Bakken, insulation, structural heating, and other precautions are standard -- winterization is the law for the oil and gas industry. That said, winter remains a challenge. A significant freeze-in occurred across the Bakken in December 2022. A freeze-in occurs when the ice crystals form in the oil and gas production system and production is halted. Freeze-ins aren't caused by frozen oil and gas but by the water vapors that rise to the surface during the extraction process. They narrow the passable area for gas, eventually making extraction less safe (Sisk, 2021). According to Reuters (2022), the December 2022 freeze-in cut the state's production by 300,000 to 350,000 barrels a day, a third of the production for the state.

The April 2022 storms impacted production more heavily, slashing 80 percent of the state's daily total, but not due to freeze-in conditions. Heavy snow and ice hindered employees from reaching job sites and snapped electrical structures keeping those who arrived from getting much done (Cooray, 2022). This is a real challenge in the Bakken where steep terrain can mean narrow private roads and significant consequences from steep drop-offs on roadsides, with little room for errors. A later risk posed by severe winter weather comes from the snow melt that follows which often needs to be pumped from the site to keep polluted snow from damaging the surrounding environment.

4.5.2.7 Delivery of Service and Continuity of Operations

Regardless of the cost to communities, roads and highways must be cleared to allow for commerce and emergency travel. Unanticipated high snow totals can be an overwhelming financial burden to small local/tribal governments, but the alternative is worse. Severe winter weather can lead to the closing of state and local government offices for the safety of employees, but the services offered may be needed by residents. While technology has increased remote options, it has not entirely fixed the problem. Extending the school year later into summer due to winter closures also negatively impacts the state.

4.5.2.8 Public Confidence in the State's Governance

For North Dakotans, harsh winters are part of life, and expectations for what the government can control are generally reasonable. Winter is part of the routine in North Dakota. It is the time to bring the cows to the barn, strap on some skis or skates, ride around a snowmobile or stay inside with a warm drink and enjoy a quieter time in life. In many ways, weathering a difficult winter is part of the identity of a North Dakotan. Winter shows and hot plates are a North Dakota tradition, where the state celebrates its cultural links to similarly cold Scandinavian countries. Tourism sites promote the range of outside activities that North Dakotans enjoy, stating:

> "North Dakotans don't let cold and winter get them down, and neither should you. Embrace the Norwegian lifestyle known as 'friluftsliv' which translates to 'open-air-living.' Year-round activities in the great outdoors and connecting with nature have positive effects on health, mind, and body" (North Dakota Department of Tourism, 2023).

Jokes may abound when weather forecasters miss on their predictions, and stress and criticism will bubble to the surface when power outages linger over time, but severe winter weather is part of life in North Dakota, including its negative externalities. **Figure 4.5-59** suggests that the indomitable North Dakota spirit will often rise up and find a ray of sunshine on even the coldest of winter days.

Figure 4.5-59: Snow Shoeing in North Dakota's Winter

Source: ND Tourism Division, 2023

4.5.2.9 Estimation of Annual Losses

Figure 4.5-60 is a chart that shows the annualized consequences of severe winter weather by hazard type using NCEI data which dates to 1996. During that time, there were 27 deaths across all events, adding up to 1 death per year, and 98 injuries resulting in 4.8 per year. Blizzards also cause the most property damage with more than $10.4 million in damages a year. Ice storms cause almost $3.9 million in property damage per year. Heavy snow is the worst for crops, since blizzards come well after harvest, at $15,000 per year (NCEI, 2023). However, crop insurance payouts may be a better measure than this dataset. USDA indemnity amounts for winter weather annualized exceed $94 million (USDA RMA, 2023).

Figure 4.5-60: Annualized Consequences from Severe Winter Weather

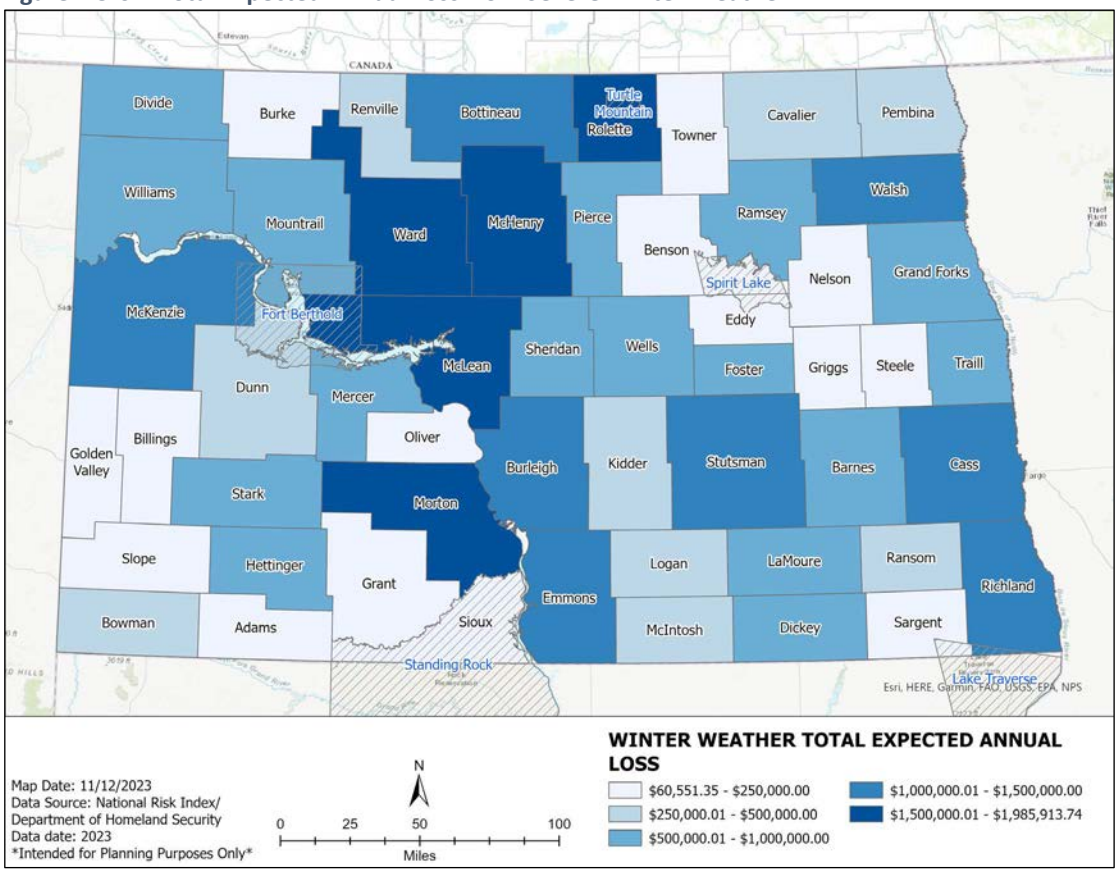
Type of Event	Annualized Damages			
	Deaths	Injuries	Property Damage	Crop Damage
Blizzard	0.4	3.8	$ 10,450,000	$ -
Winter Storm	0.2	0.8	$ 1,536,808	$ -
Extreme Cold/Wind Chill	0.08	0	$ -	$ -
Heavy Snow	0	0	$ 348,269	$ 15,385
Cold/Wind Chill	0.3	0.08	$ 13,846	$ 2,885
Ice Storm	0	0	$ 3,857,692	$ -
Frost/Freeze	0.04	0.1	$ 577	$ -
Freezing Fog	0.04	0	$ 14,808	$ -

Source: NCEI, 2023

FEMA's NRI examines expected annual losses from a wide range of hazards but is a new dataset that uses data only from 2021 and 2022. **Figure 4.5-61** looks at the total expected annual loss in the NRI dataset for severe winter weather. Likely due to the short span, the loss has no discernible pattern.

From the Adams County Community Coffee, "Senior citizens are especially impacted by severe weather and the loss of power. In a recent event one citizen was running out of oxygen as home care equipment was not able to generate oxygen without electrical power. There was consideration for opening a shelter where a generator was available to generate power; however, generator maintenance had not been done and the generator was not operational. Thankfully, snow mobile operators were able to deliver oxygen from the hospital to the citizen and it was not necessary to open the shelter. The question was raised that had the shelter been needed for multiple vulnerable citizens, access and transportation could be a challenge in events with large amounts of snow. Clearing roads and digging out individuals from homes with snow blocking entrances to the home would be a high resource demand and time-consuming process."

Figure 4.5-61: Total Expected Annual Loss from Severe Winter Weather



Source: NR!, 2023

4.5.2.10 Community Resilience

Record snowfall in the 2022-2023 winter led the state to pass legislation that would aid local governments with this cost. Senate Bill 2183 made $20 million for snow removal grants available to local and tribal governments that had costs exceeding 150 percent of the average of four of the previous winter's snow removal costs. According to Burgum (2023), it was a popular bill, receiving full Senate support with one detractor in the House.

In addition to financial support, the state has taken other steps to try and help all parties in the state to cope with severe winter weather. Senate Bill 2054 in the 2023 Legislative Assembly increased the State Highway Patrol's ability to enforce road closures including fining motorists who ignore road closures (S.B. 2054, 2023). Technology has also helped improve information for motorists and local officials by including road cameras and improving the information on its travel advisory site. Snowplows are now being tracked on an app so people can make decisions about travel that include cleared roads (NDDOT, 2022). Better rescue equipment has been purchased by the State Highway Patrol. The Emergency Communications Plan for the North Dakota Department of Health and Human Services includes a partnership with the NWS offices to help make more informed advance decisions.

4.5.2.11 Future Conditions

This section evaluates how changes in existing conditions may impact severe winter weather and the risks that they pose. Through the end of this century in North Dakota, expect larger, more frequent, and more intense periods of heavy wet snow, mixed precipitation or ice storms and freezing drizzle or mist. Though temperatures are expected to continue a slow increase, periods of extremely cold temperatures are quite likely to occur. These future conditions are expected to increase the potential impacts of most other natural, civil, and technological hazards as they stress transportation corridors and infrastructure. Information extracted from the NOAA National Centers for Environmental Information, Summary for North Dakota (Frankson, 2022), the Northern Great Plains Chapter of the Fifth National Climate Assessment (Knapp, 2023), and related resources, provides a basis for the following list:

- **Location:** Severe winter weather will continue to be a threat throughout the state.
- **Extent/Intensity:** Severe winter weather events are expected to increase in both extent and intensity, commensurate with the projected increase in Colorado Low (low-pressure area originating in southeast Colorado) type winter storms and a corresponding increase in heavier snowfall, heavier snowfall rates, and the incidence of freezing rain/ice storms.
- **Frequency:** At any specific location, the number of severe winter weather events is likely to increase due to expected larger size (footprint) storms, even though the number of storms may not increase.
- **Duration:** At any specific location, the duration of severe winter weather events is likely to increase due to expected larger size (footprint) storms, even though the number of storms may not increase.

4.5.2.11.1 Extreme Climate Variability and Climate Change

Through the end of this century, North Dakota's natural yet extreme climate variability will likely continue to be the primary signal within each natural hazard (Frankson, 2022). This may directly or indirectly impact jurisdictions and peoples across the state over days to decades long timescales, while the much more subtle and gradual trends of climate change over the rest of this century are likely to further extend the range of such variability (Knapp, 2023). And as such studies show, both trend and variability could well extend beyond that which has previously been documented in the historical record.

> There is only a single road access to some critical facilities in Hettinger. Access to these could be blocked by a winter storm event.
>
> *(Adams County Multi-Jurisdictional Hazard Mitigation Plan, 2019)*

Recent climate trends have shown, and future projections suggest that the state can expect continued gradual warming in all seasons, with the greatest warming in the winter season. Overall precipitation is likely to increase, with a high degree of inter-seasonal and interannual variability which could lead to longer and stronger droughts interspersed with more frequent and more intense flooding (Swain, 2015). Severe winter season storms will likely continue to occur in both drier, drought-prone periods, and wetter, flood-prone periods within the state's overall extreme climate variability (Easterling et al., 2017). For example, the recent "dry" winter of 2021-22 saw a greater than average number of Alberta Clipper type storm systems which produced less total snow with more ground blizzards and/or high wind

episodes (Gust, 2022; NCEI/Storm Data, 2023). In contrast, the recent "wet" winter of 2022-2023 saw a greater than average number of Colorado Low type storm systems which produced more total snow and more heavy snow, blizzard, and ice storm events.

Earlier studies had shown that a more extensive snow cover contributed to a greater frequency of cyclones in the southern Great Plains and southeast United States and a reduction in the frequency of cyclones tracking further north due to the displacement of the storm track (Heim, 1984). However, future climate projections indicate the inverse shift in storm track, with a poleward shift in snow cover extent and duration expected (Clare, 2023). The greatest shift is expected to occur in the shoulder months (November, December, March) and the least in the core mid-winter months (January, February).

These future climate projections suggest that the Northern Great Plains region will experience an overall decrease in Alberta Clippers, a fast-moving low pressure system beginning in Alberta, Canada, and an increase in Colorado Lows, over time (Eichler, 2013; Trellinger, 2018). The implication being that future climate conditions will likely produce more heavy snow and/or ice dominated "wet" winters and fewer "dry" winters.

Improper placement of existing shelter belts adjacent to roadways contributes to blockage of roads. *(Walsh County Multi-Jurisdictional Hazard Mitigation Plan, 2021)*

Larger and warmer overall winter storms, like the Colorado Low storm type, produce greater overall impacts per specific area (Trellinger, 2018). Warmer wintertime temperatures in concert with greater low-level moisture availability, through any combination of moisture transport and local evaporation, produce larger footprint (areal extent) winter storms along with larger areas of heavy snow and/or ice, with a greater total moisture load (Coleman, 2017). In the Northern Great Plains, these currently occur most often in the late fall/early winter period and the late winter/early spring period (Kennedy, 2019). When larger footprint winter storms travel at roughly the same speed as smaller storms, the storm frequency, intensity, and duration at any one location are expected to increase.

In more compact and colder winter storm systems, like an Alberta Clipper and Arctic Front storm types, the snow-water ratio will be higher, resulting in a drier and fluffier snowfall and snowpack with less overall snow-water content (Trellinger, 2018). These storms can often produce significant snowfall in inches of accumulation, usually with much narrower heavy snow bands, much lower total snow load, and a smaller overall impact area.

4.5.2.11.1.1 Impact

Potential impacts include an expected increase in winter period snowfall, heavy snowfall and/or freezing rain/ice events. Thunder-snow, ice storms and freezing drizzle events are most commonly found across the Central Plains, Ohio Valley and Eastern Great Lakes states, though this pattern has been shifting steadily poleward (north) from the latter quarter of the last century through 2014 (Groisman et al., 2016). Model projections indicate that future warmer temperatures in the Northern Great Plains region will support a higher incidence of mixed precipitation (sleet), freezing drizzle or rain and ice storms (Easterling, 2017). Impacts on transportation include an increased incidence of icy walkways, roadways, railways, and airport runways (Kostianaia et al., 2021). Impacts on power transmission include an increased incidence of ice loading on wires and the potential for an increased incidence of

accompanying wind effects. Infrastructure impacts include an increased snow and ice load on roofs and an increased potential for roof damage.

Human health impacts include an increased incidence of heart, back and/or muscle related injuries from shoveling snow or falling on ice. Some advantages of a shorter overall winter season include the potential for fewer extreme cold impacts, though there could be a corresponding increase in wet-cold (hypothermia) impacts (Kircher et al., 2022). Likewise, there could be more storm days at any specific location to contribute to social-isolation issues, but a shorter overall winter season could decrease net social-isolation issues.

Economic impacts due to increased frequency, intensity or duration of winter storms may include loss of work hours, lost commodity sales (Burrows et al., 1979), plus property damages, and storm related clean-up costs (Matthews 2015). Overall warmer wintertime temperatures and shortened winter season could reduce heating costs and provide for increased snow-free wintertime "shoulder season" days for outdoor work (Liess et al., 2022). Any gain in outdoor work time during these shoulder seasons may help offset projected workday losses due to increased extreme heat in the summertime.

Projected winter season precipitation increases do not necessarily have a one-to-one relation with winter storm events, as lesser snowfall episodes (non-severe) can occur with a greater frequency.

Spring snowmelt flooding is dependent on a variety of precursor conditions (Livneh et al. 2016), but flooding increases are considered highly likely. Most extreme flooding episodes across North Dakota including those in the past few decades, have been spring snowmelt flooding caused by a combination of widespread heavy winter season snowfall accumulations and rapid snowmelt runoff, with concurrent warm rainfall as a potential runoff accelerant. However, studies have shown that these recent large floods were caused by natural variability within the local climate system (Hoerling, 2013; Hoell, 2023). The future climate suggestion is that episodes of heavy convective rainfall concurrent with spring snowmelt flooding could increase through the end of this century.

4.5.2.11.1.2 Adaptation

Traditional adaptation/mitigation methods for severe winter storm conditions used in certain or proposed future severe winter weather adaptation measures may also be considered as mitigation measures, especially those that involve improvements in temperature and precipitation monitoring and forecasting systems. These systems allow for proactive assessment of winter weather conditions in near-real time and for enhanced forecasting of and response capability to the threat of severe winter weather. For example:

- **Existing Surface Observation Systems.** Across North Dakota, including the Souris and Red River Basins, there is a steadily increasing density of automated weather/climate monitoring stations like automated surface observing system/automated weather observing system (NCEI, 2023), North Dakota Agricultural Network (NDAWN, 2023), and North Dakota Department of Water Resources (NDDWR)/Pushing REmote SENSors (PRESENS) (NDDWR, 2018) data collection platforms with their respective atmospheric and soil moisture/soil temperature monitoring capabilities.)
- **Human Augmented Reports.** As supplied by NWS Cooperative Observers (NWS-COOP, 2023), the voluntary Community Collaborative Rain, Hail, and Snow (CoCoRaHS) Network (CoCoRaHS,

2023), and SkyWarn Storm Spotter (SkyWarn, 2023) networks can provide additional details that are often crucial for flood prediction and response.

- **Existing Weather Radar Systems.** The Federal NEXRAD (NEXt Generation RADar) System, installed through the middle 1990s and operated by the NWS, covers most of the state and its primary drainage basins with some notable exceptions or radar gaps (NEXRAD Locations, 2023). See mitigation section below for more details.

These surface weather observations and radar observations help determine the areal extant and amount of rain and snow likely affecting an area in near real-time, and which may hasten appropriate storm preparedness, response, and eventual recovery (Gust, 2015). Likewise, River Gauge Networks monitor water runoff in streams and rivers, while both Hydrologic and Hydraulic Flood forecast Models use surface rainfall estimates, snowmelt estimates, and streamflow measurements to determine downstream river responses and potential flood impacts.

4.5.2.11.1.3 Mitigation

The projected increase in severe winter storm events suggests a commensurate increase in the ability to detect precursor weather conditions with a greater degree of accuracy and specificity, and to observe and forecast such conditions as quickly as possible. An increased density of all types of surface-based sensors, including weather radars is desirable, in that higher forecast specificity in time and space requires a higher observation density in time and space (Gust, 2015).

Across North Dakota, including the Mouse and Red River Basins, there is a steadily increasing density of weather/climate monitoring stations like NDAWN (NDAWN, 2023) and NDDWR/PRESENS data collection platforms with their respective atmospheric and soil moisture/soil temperature monitoring capabilities.

Across Traill County there is critical infrastructure which needs alternative power methods should there be a power outage caused by severe winter weather. There are two emergency routes (Neillsville Bridge #412 and County Road 17) which need to be repaired to allow for emergency responders to get to where they need to in the event of a medical emergency during severe winter weather.

(Traill County Multi-Jurisdictional Hazard Mitigation Plan, 2017)

The United States Army Corps of Engineers, in collaboration with the state climate offices, is now establishing a soil moisture and snowpack monitoring network throughout the middle and upper Missouri River Basin, (Water Resources Development Act 2020; Spinrad, 2021). A total of 529 stations are scheduled for installation between 2021 and 2027 on a 25-square-mile grid at elevations below 5,500 feet. The data from these stations, which include multiple soil moisture and temperature depths and snow depths, will be directly available to NOAA to track and forecast flooding, drought, and other climatic and weather events. Note, that the Mouse River Basin remains underrepresented for surface weather observations and soil moisture and soil temperature gaging systems, in comparison to mitigation efforts recently initiated across the Red River and Missouri River systems.

Williams County installed a supplementary “Gap-Filler” Weather Radar in March 2020 (Williams Co., 2023), for an area of increased population and storm related impacts but otherwise sparse in low-level radar coverage in northwest North Dakota. A similar area of sparse low-level radar coverage persists across southwestern North Dakota.

4.5.2.11.2 Other Changes

One concern that can lead to increased consequences for severe winter weather in North Dakota is the increase in the older population in the state. As discussed earlier, older people suffer more human health consequences from cold weather and are less capable of shoveling and addressing maintenance issues that may be necessary to avoid property damage from heavy snow and ice. By 2025, 18 percent of the state is expected to be 65 or older, up from 12 percent of the state in 1980 (ND Compass, 2020).

While NDDOT cameras serve as one tool for collecting information, there is a demonstrated need for improved visibility sensors that detect and report blowing snow. Local North Dakota researchers are developing improved methods to better estimate visibility under blowing snow and blizzard conditions (Kennedy et al., 2022). Since wind is such an important and prevalent part of our winter storm environment, such measurements are essential for improved local and regional detection, preparedness, and response efforts.

The urban areas of the state are anticipated to have a 24.6 percent growth rate between 2020 and 2040 (U.S. Census Bureau, 2020). Areas in and near Fargo, Grand Forks, Bismarck, and Williston will see more infill development and development on their fringe and nearby smaller communities, increasing traffic in these areas when roads are dangerous. The western North Dakota counties of Dunn, McKenzie, Mountrail, and Williams have grown at a rate of 72.3 percent since 2010 (U.S. Census Bureau, 2020), and growth is expected to continue at a rate of 54.9 percent. This has already led to new development in areas like Williston, Minot and Dickinson and the rural areas between them. Accommodating the booming oil and gas workforce and their young families will increase development and critical infrastructure in these areas, placing more people and property at risk from harm from winter storms, in work roles that often require travel on narrow roads.

Areas like the Four Bears Bridge, which can be hazardous in windy or freezing conditions will see increased traffic that makes this route more dangerous. There are five communities that experienced more than 75 percent growth between 2010 and 2020: Rock Island Township (Williams), Hope Township (Ramsey), Pleasant Hill Township (Kidder), Alex Township (McKenzie), and Redmond Township (Mountrail). Each are experiencing increased traffic due to growth, placing area roads at greater risk (U.S. Census Bureau, 2010, 2020). Six of the fastest growing communities in the state are in Williams County, and four are in McKenzie, which saw an increase of over 131 percent from 2010 to 2020 (U.S. Census Bureau, 2020). Additionally, according to the 2020 Census, Stark County has increased in population by 39 percent. Mountrail, Cass, Morton, Burleigh, and Billings Counties all saw at or over a 20 percent increase in population from 2010 to 2020 (U.S. Census Bureau, 2020). While the increase in population is positive for the economy, many of these areas have roads not heavily serviced by interstates leading to an increased number of people on the road, local traffic, the potential for an increase in the number of people driving on dangerous roads from severe winter weather.

4.5.3 Risk Analysis

Risk can be defined as the potential for loss of or damage to an asset (FEMA EMI, 2023). This section analyzed the potential for loss or damage in North Dakota.

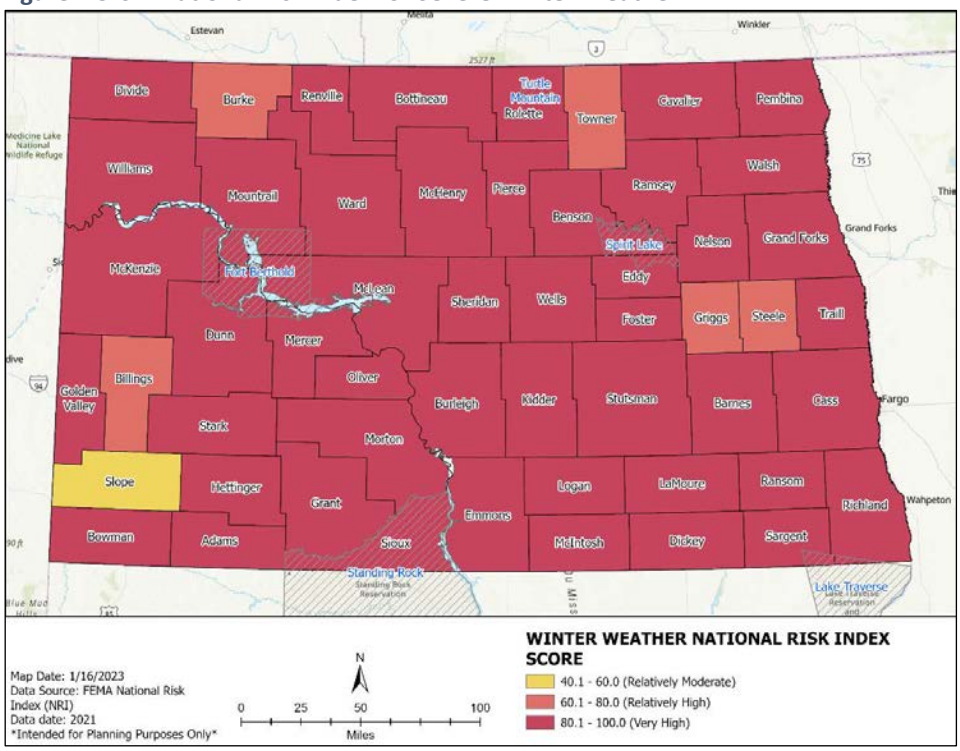
4.5.3.1 National Risk Index

The National Risk Index leverages available source data for natural hazard and community risk factors to develop a baseline risk measurement for each United States County and Census tract. The risk equation behind the Risk Index includes three components: a natural hazards component (Expected Annual Loss), a consequence enhancing component (Social Vulnerability), and a consequence reduction component (Community Resilience). The dataset supporting the natural hazards component provides estimates measured in 2022 United States dollars. The datasets supporting the consequence enhancing and consequence reduction component have been standardized using a minimum-maximum normalization approach prior to being incorporated into the National Risk Index risk calculation. Using these three components, composite Risk Index values and hazard type Risk Index values are calculated for each community (county and census tract) included in the Index. Risk Index values form an absolute basis for measuring Risk within the National Risk Index, and they are used to generate Risk Index percentiles and ratings across communities. Categories of risk are expressed as quintiles, between 0.0 and 100.0, where risk scores are relative to other countries nationally.

The NRI, as described above, is different than the probability of occurrence of these phenomena (FEMA, 2023). North Dakota, given its northern geographic location, has a very high probability of various severe winter weather phenomena. On average, North Dakotans also have a lower overall social vulnerability regarding these hazards and an overall high level of community resilience.

Even with that resiliency, North Dakota's NRI for severe winter weather is generally high. **Figure 4.5-62** shows the NRI score for winter weather, with all counties except for Slope County being ranked at a high or very high risk for severe winter weather.

Figure 4.5-62: National Risk Index for Severe Winter Weather

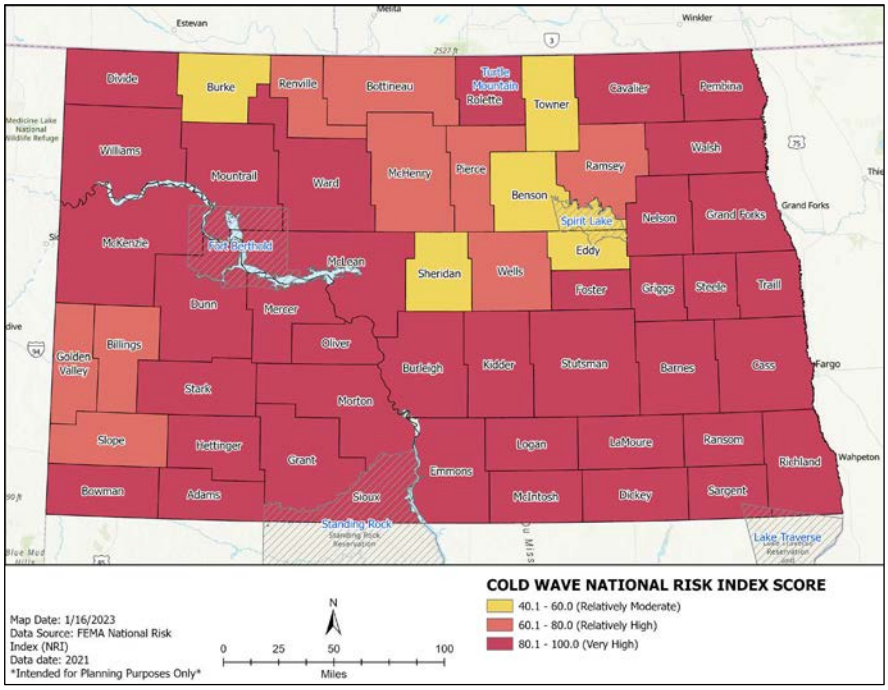


Source: NR!, 2023

Figure 4.5-63 looks at the same dataset at the hazard of cold waves. Again, North Dakota's exposure to Cold Waves is very high, and Figure 4.5.16 (Annualized Cold Wave Event Days), earlier in this section, indicates that north central ND has the highest overall *frequency* of Cold Wave Event Days in the state. In contrast, the NRI data shows that many northern counties register as only a moderate to high *risk* for cold waves, with the north-central portion of the state registering the least risk in the state for the hazard. According to the NRI Technical Documentation, 2023), in many of those ND communities the potential consequences of those frequent and expected cold waves have been ameliorated through some combination of social, structural, and/or procedural means.

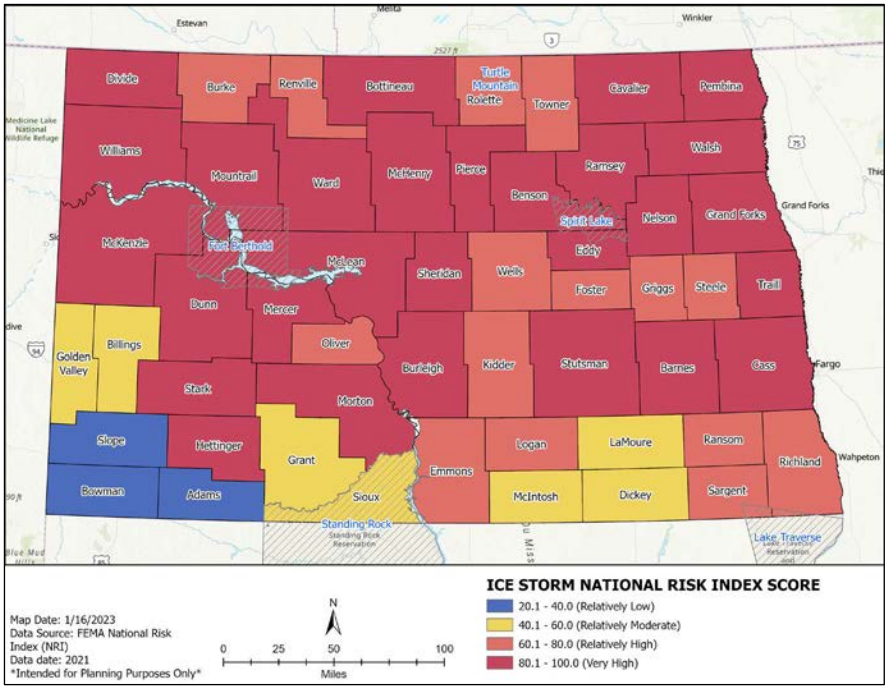
Figure 4.5-64 looks at the risk for ice storms as evaluated in the NRI dataset. Risk skews generally north and east in the county, with Slope, Bowman and Adams counties in the southwest registering as a low risk for ice storms and the Missouri and Red River Valleys posing high or very high risk for ice storms. While much of the state is still in the high-risk category, some southern counties have relatively low levels of risk when compared to the state and nation as a whole.

Figure 4.5-63: National Risk Index for Cold Waves



Source: NRI, 2023

Figure 4.5.64: National Risk Index for Ice Storms



Source: NRI, 2023

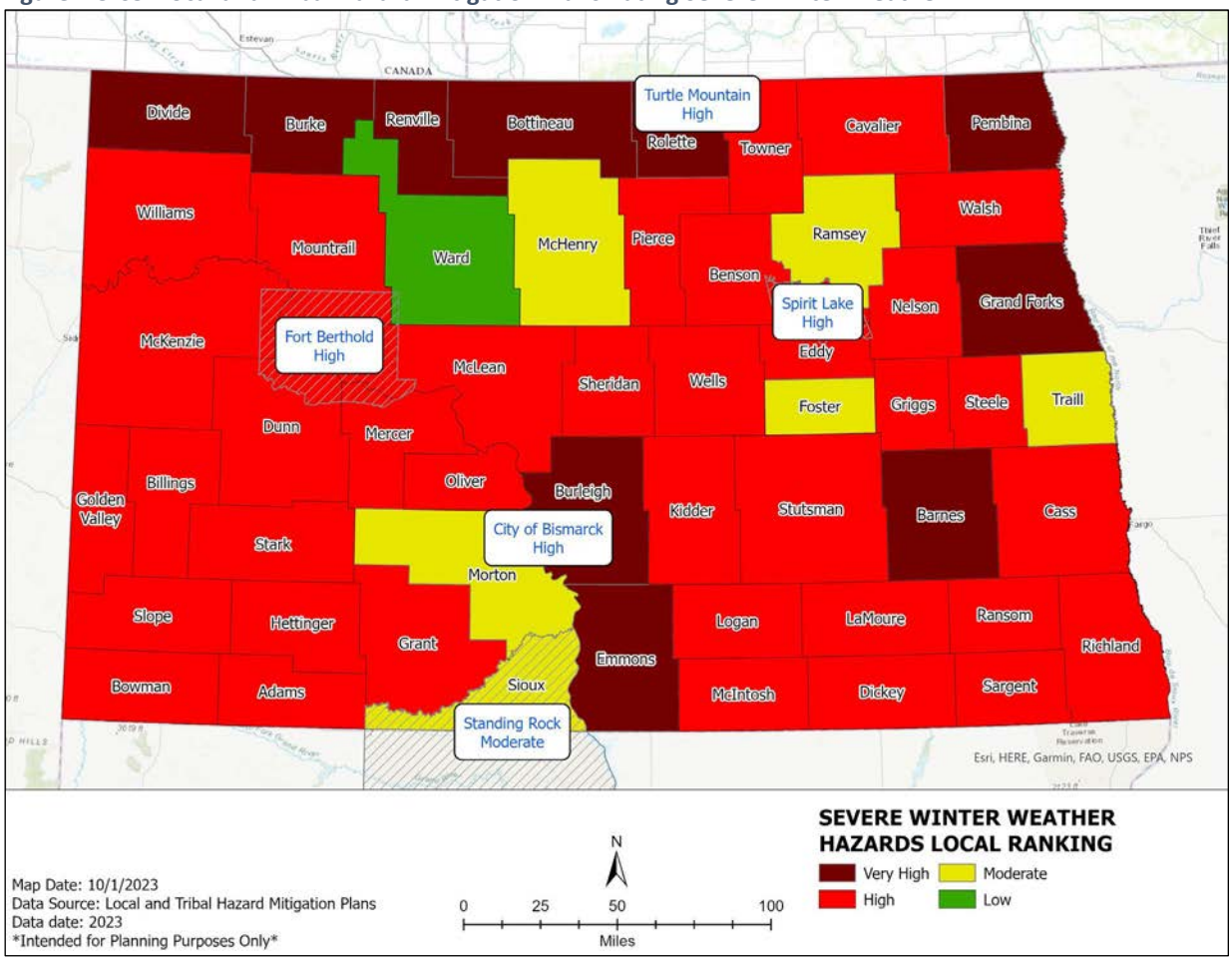
4.5.3.2 Risk Index Score

The Priority Risk Index for this plan update ranks severe winter weather as a high risk with a score of 3.2. This ranks severe winter weather as 5 out of 15 hazards.

4.5.3.3 Jurisdictions at Risk

When evaluating local and tribal mitigation plans, 58 of the 58 jurisdictions with adopted plans identify severe winter weather as a hazard impacting their jurisdiction, as shown in **Figure 4.5-65**. Of all the plans that ranked hazards, 50 considered it a high or very high risk.

Figure 4.5-65: Local and Tribal Hazard Mitigation Plans Rating Severe Winter Weather



Source: Local and Tribal Hazard Mitigation Plans, 2023

4.5.4 Summary/Conclusion

The following bullets summarize highlights and conclusions related to severe winter weather.

- North Dakota is a northern state in the plains and experiences a wide range and regular frequency of winter hazards that can begin early in the fall and extend into the spring.
- Because of regular severe winter weather, state, local and volunteer agencies have a history of coordinating to meet needs relating to rescue and aid.
- The wide-open spaces of the prairie can facilitate wind chills that reach dangerous levels.
- Road closures and no-travel advisories are common safety measures adopted by the state, and recent laws allow for more strict enforcement of these safety measures.
- The fragility of the electric grid can be demonstrated by the accumulation of ice causing millions of dollars in damage to power lines and electrical structures. High winds and falling limbs can also damage these infrastructures which can lead to lengthy power outages in times of bitter cold in the state.
- Excessive cold is more common in the northern part of the state, but blizzards are more common in eastern North Dakota. All severe winter weather can be experienced anywhere in the state.
- Most severe winter weather is becoming more common over time.
- The elderly, poor, those without access to vehicles and those with long commutes can be more vulnerable to impacts from cold weather or to being exposed to dangerous conditions.
- Language isolation and new immigrants from warmer climates can be uninformed about how to cope with severe winter weather and may need an outreach strategy targeted to teach them about the risks, especially in areas like Walsh County where winter events are common.
- Winterizing properties and monitoring snow loads can be critical to avoiding property damage. Part-time residences and part-time cultural facilities can be vulnerable to collapse.
- The sick and elderly may need assistance in clearing the property of snow to avoid further health complications. Lengthy outages or heavy snow can provide challenges for those who struggle with health issues or rely on medicine.
- Early snow events are particularly challenging for farmers, and late snow events are a bigger challenge for ranchers, who are often dealing with newborn livestock and animals that are pregnant and awaiting delivery, all of which are more vulnerable to snow and cold.
- Most energy industries and structures are weatherized for the conditions, but the harshest of conditions can cause problems with wind turbines, natural gas lines and with the safety of employees getting to oilpatch work sites.
- Surviving and thriving in winter is integral to the identity of North Dakotans, as is banding together to survive the worst conditions.

- While North Dakota is at high risk for severe weather, local jurisdictions recognize that risk and plan accordingly.

4.5.5 Data Limitations

All data in the severe winter weather hazard profile was supplied from a variety of state, local and federal sources. Of the collective hazards addressed in the severe winter weather hazard profile, not all hazards have been recorded as thoroughly and for as long a historical duration as others. For example, blizzard, heavy snow, and ice storm are all types of winter storm and were not always separated in older historical records. Additionally, neither private nor municipal data was included for this state-level plan and may provide additional, supplemental insight had it been included.

4.6 Severe Summer Weather

4.6.1 Overview

4.6.1.1 Description

This section defines the types of severe summer weather that can impact North Dakota. All severe summer weather phenomena described in this hazard section are a result of deep convective activity and thunderstorms, with the exception being excessive heat. All thunderstorms have both ice formation and liquid droplets, with internal charge separations that produce lightning and the accompanying sound of thunder, and often produce strong gusty winds at the surface, along with heavy rains, and hail (AMS, 2012). However, while lightning exists with all thunderstorms, it is not a specific condition for severe thunderstorms, which will be discussed in detail in this section. Flash flooding can also follow summer season rainfall events and this potential is discussed in the Flood Hazard section of this plan.

4.6.1.1.1 Lightning

Figure 4.6-1: Lightning near Bismarck North Dakota, 5 July 2014

Source: Bower, NOAA, 2014

Lightning, and the corresponding sound of thunder, is the most frequent, often the earliest notice of a potential severe thunderstorm hazard phenomena. Lightning occurs in-cloud, cloud-to-cloud, cloud-to air, and cloud-to-ground. The AMS (2022) provides a comprehensive definition of lightning, as:

> "A transient, high-current electric discharge in the atmosphere with path lengths measured in kilometers. Lightning is comprised of dendritic networks of leader and streamer discharges that form the physical dimensions of the flash and determine its emission spectrum. Natural lightning arises from the strong electric fields that exist between separate regions of thunderstorm (cumulonimbus) clouds whose hydrometeors have a surplus of either positive or negative electric charge. The initial breakdown occurs when the local electric field overcomes the electrical impedance of the air and typically leads to the development of bidirectional leaders that self-propagate through the positive and negative charge regions—though, at different stages of the process, unidirectional leader development can occur."

And a single cloud-to-ground lightning strike can produce 30,000 Amperes of electrical current, on average, or 2,000 times the jolt of a typical household electrical outlet. The CDC (2022) reports that these produce dozens of deaths nationwide, each year, along with hundreds of permanent injuries.

4.6.1.1.2 Severe Thunderstorm

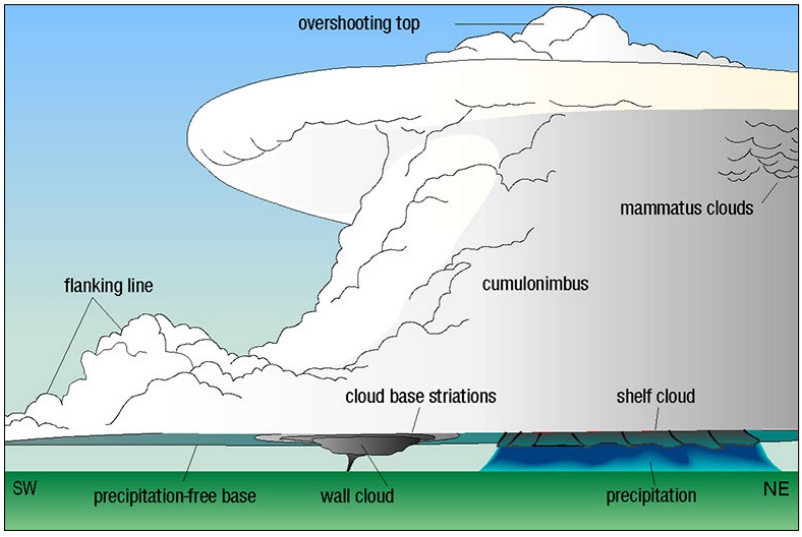
The National Weather Service (2023) defines a severe thunderstorm as one which produces one or more of the following:

- Large Hail, at 1 inch diameter or larger.
- Damaging wind gusts of 50 knots (58 miles per hour) or greater. And/or
- A tornado, of any size or intensity.

Thunderstorms are usually short in duration, seldom exceeding two hours for any one storm and a common summertime occurrence across North Dakota. The NSSL (2023), states that at any given moment there are 2,000 thunderstorms occurring somewhere on the planet.

All thunderstorms are marked by at least one large cumuliform cloud reaching high in the atmosphere. Single-cell thunderstorms are generally smaller and weaker storms, usually forced by summer's daytime heating, and rarely producing severe weather. Multi-cell storms, or storm clusters, can work together to build stronger storms and produce an increased risk for severe weather. With frontal system forcing, these storm clusters can become a more organized squall line that may develop and extend across great distances ahead of an approaching cold front. Severe thunderstorms along the squall line can generate pockets of large hail, damaging winds, and the occasional weak, embedded tornado. A supercell thunderstorm, as shown in **Figure 4.6-2**, is a highly organized type of thunderstorm, with a tilted and strongly rotating updraft that can punch into the stratosphere, at heights of 50,000 feet or more. According to the NSSL (2023), these storms can develop singly, or as part of a squall line, can persist for several hours, and can move from county to county, often producing more widespread severe weather, and more destructive tornadoes.

Figure 4.6-2: Diagram of a Supercell Thunderstorm



Source: NOAA National Severe Storms Laboratory, 2023

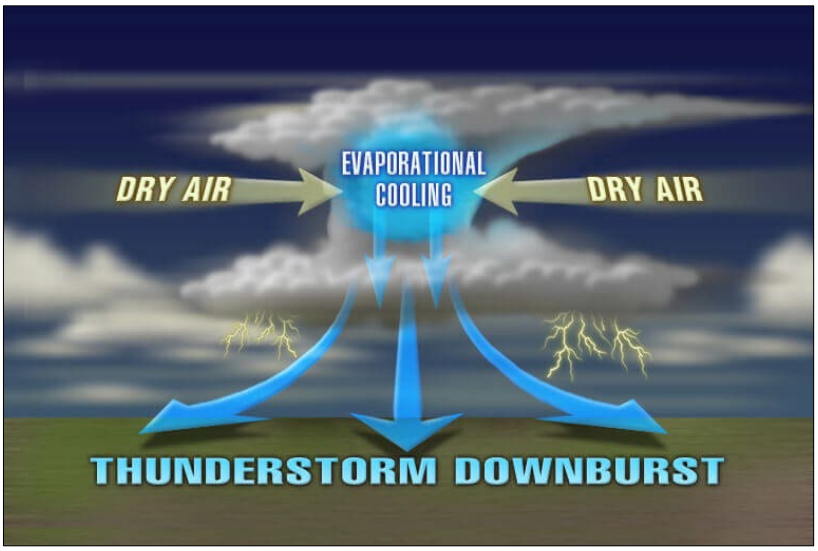
4.6.1.1.3 Large Hail

The AMS defines hail as, "precipitation in the form of balls or irregular lumps of ice, always produced by convective clouds, nearly always cumulonimbus" (AMS, 2012). Hailstones are formed in the updraft area of convective storm as raindrops and droplets are carried high into the atmosphere where they freeze, collide and/or coalesce with other raindrops and droplets, increasing in weight until they can no longer be carried in the updraft, or the updraft loses its strength, allowing the hailstones to fall to the ground (NSSL, 2023). Hailstones are often largest in the upper reaches of a thunderstorm and decrease in size as they fall through heavy rain within a cloud, with largest hailstones often striking the ground outside the heavier rainfall areas. Since 2010, large hail in the U.S. is defined at 1 inch diameter or greater, roughly the size of a quarter (NWS, 2023). Prior to 2010, large hail was considered to be 3/4 inch or greater.

4.6.1.1.4 Strong/Damaging Thunderstorm Wind

In summertime convective storms, the terms Strong Wind (NRI, 2023) or Damaging Thunderstorm Wind (NWS Severe Weather Product Specifications, 2023) are used to describe wind gusts at 58 miles an hour, or greater, which result from thunderstorm downdraft and outflow near the Earth's surface. These winds are most commonly described as either downburst or straight-line winds. Note that the term *high wind* refers to sustained winds of 40 miles per hour or greater, and is typically associated with larger scale, non-convective or non-thunderstorm weather systems, mainly associated with severe winter weather systems.

Figure 4.6-3: Diagram of a Downburst



Source: NOAA, ScjiJinks, 2024

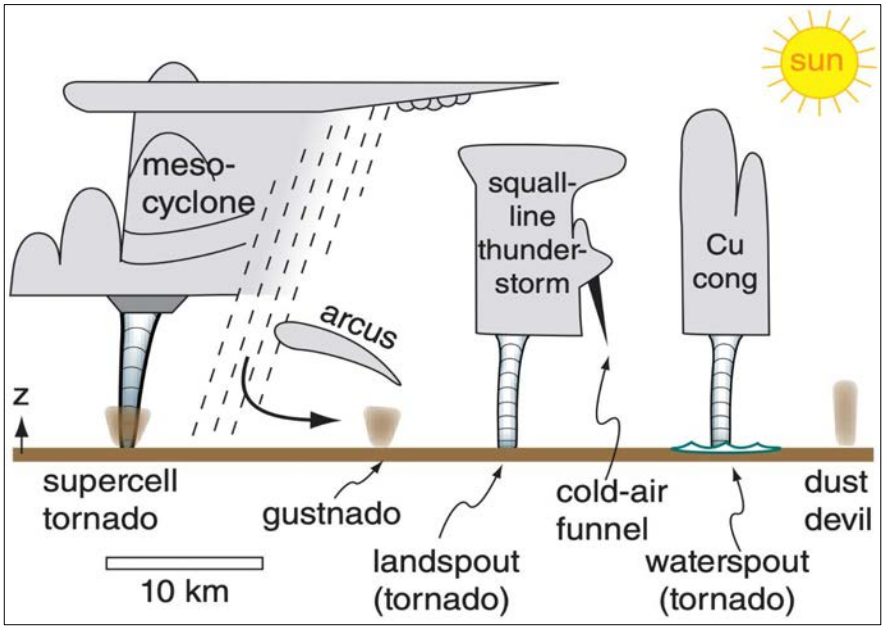
Downbursts are areas of strong, often damaging winds produced by one or more convective downdrafts (AMS, 2023), under or very near the causative thunderstorm. These downburst winds tend to fan out in all directions as they impact the surface, especially for a slow-moving or stationary storm. There are two main categories of downbursts – microbursts, 2.5 mile or less diameter, and macrobursts, more than 2.5 miles in diameter. Microbursts can be wet, within a thunderstorm rain shaft, or dry in nature, when produced by evaporation below a high-based rain shower. According to the NWS Storm Prediction Center (SPC, 2023), a derecho is an especially large and long-lived downburst, pushing outward from the leading edge of a fast-moving squall line, covering at least 400 miles (650 kilometers) in length and 60 miles (100 km) in width, with widespread straight-line winds, damaging downburst clusters, and even an embedded tornado or two. From the NWS Glossary (2023), a gust front wind is the leading edge of thunderstorm outflow, either a singular supercell thunderstorm or a line of thunderstorms.

Straight-line winds are so-called because they combine the forward motion of a singular supercell thunderstorm or a line of storms, with the downburst wind potential of that storm complex, producing a swath of damage that projects *in one primary direction*, out ahead of the storm (SPC, 2023). Straight-line winds produce the most widespread and often costliest type of thunderstorm damage in the state, primarily because of their larger coverage areas. These damaging wind gusts often exceed 58 miles per hour, reaching peak wind of 80 to 100 miles per hour at times. Imagine the damage produced by golf-ball sized hail driven by 80+ mph winds, shattering the roof, windows, and siding of well-built homes, striping previously healthy fields down to stubble, tilting and snapping miles of wooden power poles. Wind gusts exceeding 80 miles per hour can push a mobile home off its foundation, tumble it across the ground if at 100 miles an hour or more. The highest recorded straight-line wind in each county in North Dakota can be found at https://www.weather.gov/bis/ndtorhistory (NWS, 2023), along with other historic North Dakota weather information.

4.6.1.1.5 Tornado

The AMS (2020) defines a tornado as, "a rapidly rotating column of air extending vertically from the surface to the base of a cumuliform cloud, often with near-surface circulating debris/dust when over land or spray when over water." Other proper defining terminology includes waterspouts, which are tornadoes that occur over certain bodies of water (not in ND), and landspouts which are a subset of tornadoes that occur independent of a parent mesocyclone (AMS, 2020). Supercell Thunderstorms, described in more detail above, often produce severe weather of every type and most often produce the more violent and longer-lasting types of tornadoes.

Figure 4.6-4: Types of Tornadoes and Other Vortices



Source: Stull, LibreText.org, 2023

Figure 4.6-4, taken from Stull (2023) shows the more common types of tornadic and non-tornadic vortices one is likely to encounter in North Dakota, with the exception that a tornado occurring over water in the Northern Plains states is not considered to be a waterspout – though it is still a tornado. Likewise, neither gustnadoes nor dust devils are considered tornadoes since they are both shallow, weak, short-lived "ground-based" vortices and are not associated with the updraft of cumuliform clouds (AMS, 2020; Gust, 2020). A common misconception is that a funnel cloud must be present (visible) for a tornado event to occur, but that is not the case. Quite often there is dust and debris generated at ground level, from the rotating column of air, long before the funnel, composed of both condensed water vapor and dust, becomes apparent.

It's important for meteorologists, public safety, and emergency management professionals alike to use proper terminology and to distinguish between these types of tornadic features in discussions with the general public, especially when conducting seasonal weather safety campaigns, but also when gathering post-storm incident reports.

Tornadoes occur in many places around the world, during their respective summer convective seasons, but are most common in the U.S. Great Plains states. In the U.S., they are most common in the South-Central states from late winter into early spring, and the North Central states from late spring through summer, occurring quite often in and around North Dakota (Gust, 2021a and 2021b). According to Zielinski (2011) and Cao, et al. (2021), these areas have a perfect juxtaposition of features important for the formation of strong tornadoes: including the N-S oriented Rocky Mountain Front Range to the west, the deep low level moisture flow coming northward from the Gulf Coast through the Southern and Central Plains states, and a high frequency of strong upper-level Jetstream-based disturbances.

4.6.1.1.6 Heat Wave/Excessive Heat

An excessive heat event is defined as a period of summertime weather that is substantially hotter and/or more humid than typical for a given location at that time of year (U.S. Global Change Research Program, 2021). In the United states, the Heat Index is used as a measure of how hot it feels when humidity is factored in with the actual air temperature (NOAA, 2023). Relative humidity (RH) is a percentage measure of the amount of water vapor in the air compared to the total amount of vapor that can exist in the air at its current temperature and pressure (NWS, 2023). The addition of humidity in the Heat Index provides a better measure of what we feel than temperature alone.

Warmer air can contain more water vapor molecules than air at cooler temperatures. At 100 percent relative humidity, the dewpoint temperature equals the ambient air temperature and the air becomes saturated, so that dew (or frost) begins to form. A higher relative humidity produces that muggy feeling, as this reduces the efficiency of the human body to cool itself. A more accurate tool for measuring heat related stress is the Wet Bulb Globe Temperature (WBGT), which is the measure used by many athletic programs and most outside workers in most states, including North Dakota (NOAA, 2023). In addition to temperature and relative humidity, WBGT considers the impacts of solar radiation and wind speed on overall physiological heat stress.

4.6.1.2 Previous Occurrences

The following section describes a few of the notable and recent events of severe summer weather in the state of North Dakota since 2018.

- On July 10, 2018, a tornado struck the south end of Watford City after midnight, devastating a recreation vehicle park, killing a newborn child, and injuring 28, nine critically (NWS Bismarck, 2023). Three were airlifted to level two trauma centers (Dalrymple, 2018). It was a rain-wrapped tornado occurring when many of the victims may have been sleeping. Residents indicated that they heard no warning siren and received no alert that a tornado was probable (Dalrymple, 2018). The EF2 event included 127 mile per hour winds, tracked for over one-half mile in around four minutes and left approximately 200 manufactured homes damaged or destroyed (NWS Bismarck, 2023). According to Dalrymple (2018), about 200 people were displaced by the storm.

Figure 4.6-5: Damage from Watford City Tornado, 10 July **2018**

Source: NWS Bismarck, 2018

- An EF1 tornado with 108 miles per hour winds touched down on the edge of Leal in Barnes County in the late afternoon of May 24, 2019 (NWS Grand Forks, 2023). A house and the grain silo were damaged, and a shed was pulled apart with its wooden members impaled into a nearby house. According to NWS Grand Forks (2023), a second tornado touched briefly near

Lake Ashtabula, and a third tracked for 5 miles near Hope, in Steele County, all within an hour's time.

Figure 4.6-6: Tornado near Leal, 24 May 2019

Source: Jones, NWS Grand Forks, 2019

- Thunderstorms spread from Devils Lake to Fargo, with 80 miles per hour wind gusts and quarter-size hail, during the morning of June 29, 2019. Another round occurred later that evening (NWS Grand Forks, 2023). Trees, wooden power poles, and construction materials were damaged. According to NWS Grand Forks (2023), several garage doors were blown in at homesites and a semi-truck was overturned on I-29 in Fargo.

Figure 4.6-7: Tornado near Alexander, 10 June 2021

Source: Christoph, 2021. Reprinted with permission.

- In June 2021, severe thunderstorms, hail, and tornadoes tormented western and central North Dakota. Several tornadoes touched down near Alexander in the late afternoon. Golf ball-sized hail and torrential rain fell on Williston, causing localized flooding that required rescues (NWS Bismarck, 2023). Hebron and Glen Ullin were particularly hard hit. A truck wash collapsed in Williston, and response was delayed to the truck wash and to two house fires because of heavy rain and hail (Dura, 2021). At least two tornadoes touched down in McKenzie County but tracked across open fields and grasslands, doing little damage. According to Dura (2021), more than 7,000 Montana-Dakota Utilities customers along the Montana-North Dakota border suffered power outages from damaged lines and structures.
- Four tornadoes touched down in North Dakota on the evening of August 9, 2021 (NWS Grand Forks, 2023). The first near Starkweather stayed on the ground for four miles with peak winds reaching 90 miles per hour. This EF1 storm uprooted trees in its path in Towner and Ramsey counties. Another briefly touched down near Binford (NOAA NWS Grand Forks, 2023). A barn was destroyed in the third touchdown near Sharon, with a fourth touchdown near Northwood before the storm moved into Minnesota where it continued producing damage.

- July 2022 was particularly eventful for severe summer weather. Thunderstorms, high winds and hail all damaged western and central sections of the state. Dickinson faced 75 mile per hour winds and flash flooding from storms on July 2 and 3, and a week later powerful thunderstorms brought gusts as high as 120 miles per hour near Fairfield and Beach, resulting in substantial damage to electrical structures (Morse, 2022). Velva had a big clean-up job after damaging winds snapped large tree branches (NWS Bismarck, 2023). On July 18, northern areas of the state experienced thunderstorms with large hail, and damaging winds. A new hailstone size record was set in Williams County with a 3-inch stone. Property and electrical structure damage occurred in Wildrose and Belcourt on the 18th, and three days later, even larger hail fell on Bismarck causing widespread crop damage. According to Morse (2022), the month calmed down after a July 22 storm with funnel clouds appeared over Minot.

In Emmons County, soil erosion due to wind and water remains a problem. On steep gradients, heavy rain washes out gullies in cultivated fields, and fields cultivated in the fall suffer extensive damage from early spring winds.

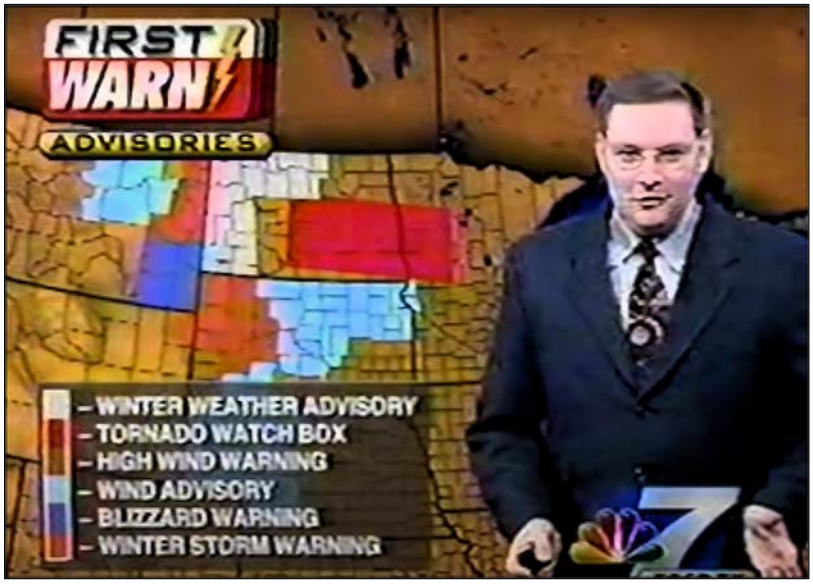
(Emmons County Multi-Jurisdictional Hazard Mitigation Plan, 2020)

4.6.1.3 Location and Extent

The variety of hazards that collectively make up severe summer weather are lightning, from any type of thunderstorm; severe thunderstorms and the components of large hail, damaging winds, and tornadoes; and excessive heat. All of these can occur anywhere in the state in any given summer season, so county or community can disregard the threat they pose. That said, historical patterns do show that the central and eastern portions of the state experience severe summer weather incidents more frequently than the western area. In North Dakota, severe *summer* weather occurs most frequently during the core summer months of June, July and August, but can start as early as March or April, usually by mid-May, and persist past mid-September, even into early November.

Figure 4.6-8: North Dakota's earliest recorded tornado occurred in northern Stutsman County around 7 pm CDT on March 26, 2003, while the State's latest tornadoes occurred through the mid to late afternoon of November 1, 2000. On that date, 5 distinct tornado paths touched portions of Burleigh, Morton, McLean, and Oliver Counties (NWS BIS: 23rd Anniversary, 2023). These tornadoes occurred as a winter storm was moving into portions of western North Dakota, with heavy snowfall spreading over these tornado affected areas later that evening. And while thunderstorms can also occur in the *winter* season, such thundersnow storms are quite rare.

Figure 4.6-8: ND Winter Weather and Tornadoes, 1 November 2000



Source: Undmet, YouTube: https://www.youtube.com/watch?v=i0LgaMyJd4k, 2012

Lightning. As mentioned earlier in this section, while lightning is particularly dangerous and is present in all thunderstorm and severe thunderstorm activity, it is not considered to be one of the specific conditions which make a thunderstorm severe. However, lightning proximity and frequency can be an important public safety factor, especially for those engaged in outdoor work, sports, or other activities. As such, lightning activity is often tracked by agencies, organizations, and individuals involved in such activities. According to the NWS Offices in Bismarck and Grand Forks (2023), it is frequently included in weather safety messaging, special weather statements, and fire weather forecast products issued by these offices as a direct function of *thunderstorm probability*.

Thunderstorm Probability and the corresponding Lightning Activity Level (LAL), as shown on the scale in **Figure 4.6-9**, indicates the frequency of cloud-to-ground lightning forecast to occur within a 30-mile radius of an observation site in a 5-minute period (NWS, 2023). The middle of the scale, LALs 2 through 5 are associated with lightning in areas with rainfall. LAL 6 is used exclusively to highlight the potential for dry lightning conditions. Dry lightning typically occurs from widely scattered and/or high-based thunderstorms, common in a more arid climate, outside of any recent rain wetted area, and is often associated with conditions that are favorable for wildfire starts (NPS, 2023). Dry Lightning is especially dangerous during the spring months, prior to the green-up of vegetation, when roadsides, grasslands and rangelands have abundant tinder-dry fuels.

Figure 4.6-9: Thunderstorm Probability and Related Lightning Activity Level (LAL)

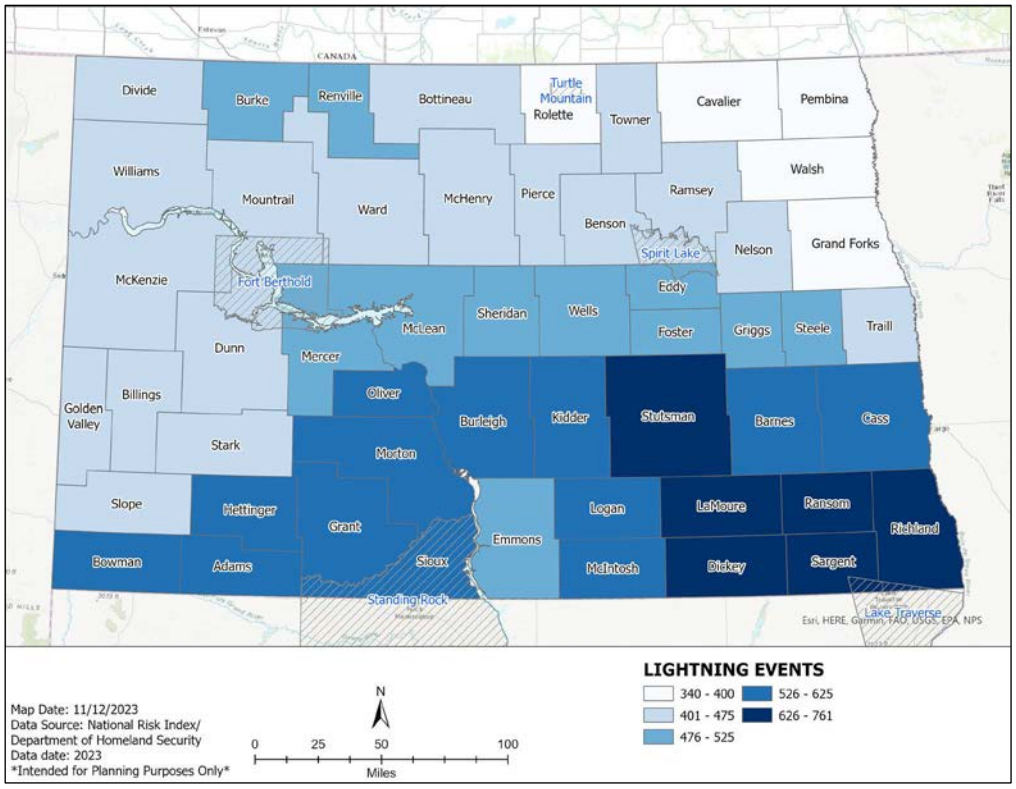
Thunderstorm Probability	Thunderstorm Category	Rain Intensity	LAL	Lightning Characteristics (CG: Cloud-to-Ground)
None	None	Variable	**1**	None
10%	Isolated	Light Rain occasionally reaching the ground	**2**	1 to 5 CG lightning strikes in 5-minute period
20%	Widely Scattered	Light to moderate rain reaching the ground	**3**	6 to 10 CG lightning strikes in a 5-minute period
30-50%	Scattered	Moderate rain is common	**4**	Frequent, 11 to 15 CG strikes in 5-minute period
60-70%	Numerous	Moderate to heavy rainfall	**5**	Frequent and intense, 15+ CG strikes in 5-minute period
20% (Dry)	Dry Lightning	Little to no rain	**6**	Like LAL 3 but without rain, w/higher wildland fire threat

Source: Compiled from NWS Glossary, 2023

Figure 4.6-10 (below) shows the number of events as detected by a network of ground-based sensors and reported in the NCEI Cloud-to-Ground (CG) Lightning Strikes database, for the 22-year period from 1/1/1991 through 12/31/2012 (NRI, 2023). The FEMA NRI analysis process plots these CG strikes in a 4x4 km grid across the conterminous United States. Its analyses show that Cloud-to-Ground strikes, per 4x4 km area, are most common in southcentral and southeastern North Dakota with lesser amounts across northern portions of the state. Note that for this particular hazard, the NRI analytics are precisely the NCEI observed data.

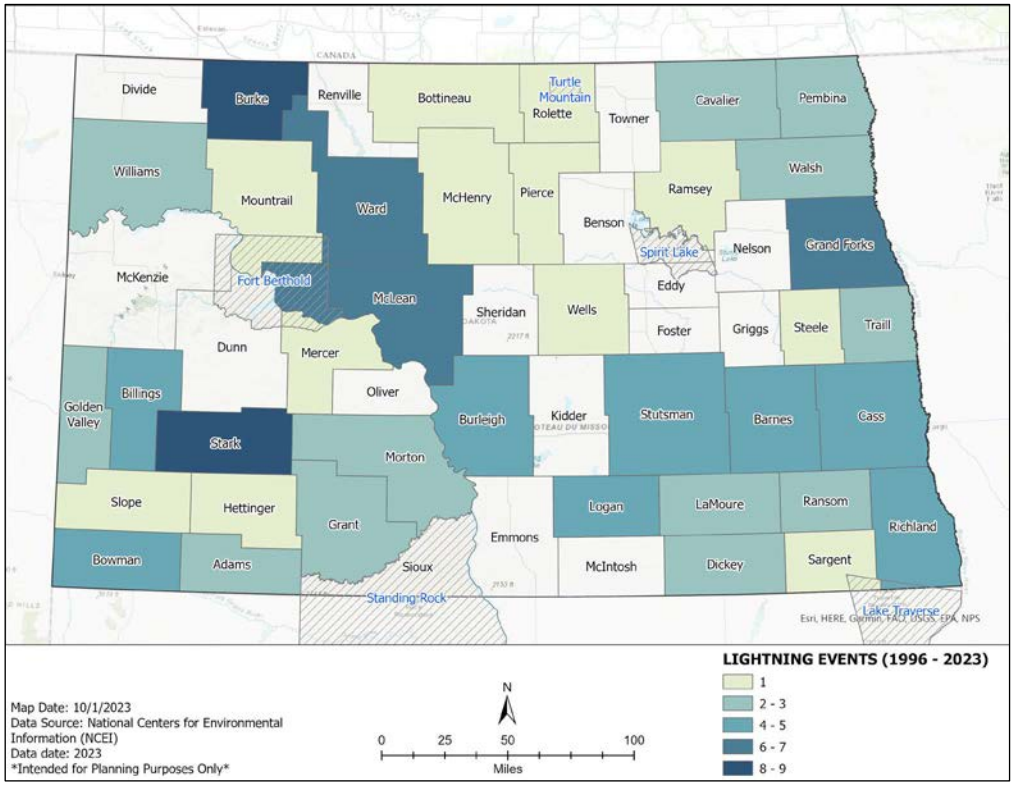
Figure 4.6-11 (below) shows a separate analysis of reports at the county scale, for total lightning related fatalities, serious injuries, or significant damage as contained in the 28-year NCEI Storm Events Database, from 1996 through 2023. Note that this lightning damage database represents only a small fraction of the overall number of Cloud-to-Ground strikes within any one 4x4 km grid area, which the 22-year NRI/NCEI CG Lightning Strike database estimated at between 15 (lowest county average) and 35 (highest county average) strikes per grid-box, per year (see Figure 4.6-34, later), or between 3000 and 7500 CG strikes per average sized county (average area: 3455 km^2). This suggests that there are likely numerous wildfire starts, power outages, personal or public property damages, and minor injuries that are not reported to or collected in the NCEI Storm Events Database.

Figure 4.6-10: National Risk Index/NCEI Cloud-to-Ground Lightning Events in ND, 1991-2012



Source: NRI/NCEI, 2023

Figure 4.6-11: NCEI Lightning Events with fatalities, injuries, or damages in ND, 1996-2023.



Source: NCEI, 2023

Large Hail. Hail, and the extent of damage that can be caused in a hailstorm incident, has historically been tracked by hail stone size which in turn has helped determine its probable impact velocity or kinetic energy (Kumijan et al., 2020). Since about 1955, the National Weather Service has gathered field reports of hail size involving either direct measurement of the hail diameter, in inches, or comparisons to familiar objects (NCEI, 2023). **Figure 4.6-12** depicts the hail size chart currently in use by NOAA's NWS and its affiliate offices, nationwide (NWS, 2021). The approximate equivalent metric size has been added.

Figure 4.6-12: NWS Hail Size References

Diameter (Inches)	Diameter* (mm)	Description
¼	6.4	Pea
½	12.8	Small marble, Mothball
¾	19.1	Penny
7/8	22.4	Nickel
1	25.4	Quarter
1 ¼	31.8	Half Dollar
1 ½	38.1	Walnut, Ping Pong Ball
1 ¾	44.5	Golf Ball
2	50.8	Lime, Hen Egg
2 ½	63.5	Tennis Ball
2 ¾	69.9	Baseball
3	76.2	Large Apple, Teacup
4	101.6	Softball
4 ½	114.3	Grapefruit
>4 ½	>114.3	CD / DVD Discs

*Source: NWS, 2021. *metric conversion of table added.*

A basic international standard for hail measurements is provided by the World Meteorological Society (WMO), with four hail size reporting categories included in the list of 10 possible report types, as specified in WMO Code 6001, NCM Table 23, (Shein, 2009; CEDA, 2023). These 4 categories are less than 5 mm, 5-9 mm, 10-19 mm, and 20 mm or larger, with the largest of these sizes similar to the ¾-inch size which has been the baseline for large/severe hail, internationally, since the mid-1900's.

Figure 4.6-13: Hailstones near Mott and Regent, 2021

Source: Morse, KFYR, 2021

According to Brothers (2009), the National Weather Service offices in North Dakota, raised the *warning* criteria for "severe hail" size to 1 inch in April of 2009, as part of an ongoing research study encompassing the NWS Central Region of the United states. This increased warning criteria was later approved and slated for nationwide implementation beginning in January of 2010 (Shein, 2009). According to the NWS (NWSI 10-1605, 2023), all reports of ¾ inch hail are still included in the NCEI Storm Events Database in an effort to maintain database continuity both historically and internationally for this large hail marker.

Extremely Large Hail. Giant hail with ≥ 4-inch (~100 mm) diameters, and Gargantuan Hail with ≥ 6-inch (~150 mm) diameters, are also extremely rare but have been measured by researchers in various parts of the globe including Argentina (Kumijan,2020), portions of western and central Europe (Púčik et al., 2029), Kazakhstan, and Bangladesh (Krause and Flood, 1997). The current United States and world record holder for a recovered and properly validated hailstone is one which occurred on July 23, 2010, in the town of Vivian, South Dakota (NWS-ABR, 2010), roughly 30 miles south of the state capital of Pierre.

Over half of the counties in North Dakota have recorded hailstones of from 4 to 5-inch diameters (NWS-BIS, 2023). North Dakota also has an 8-

inch diameter hailstone in the record books, one which occurred on July 21, 1969, just north of the community of Warwick in southeastern Benson County (NCEI, 1969 July). However, newspaper accounts at the time indicated that the Warwick hailstone appeared to be composed of two very large (greater than 4-inch diameter) hailstones that had fused together during their descent. In contrast, the NCEI State Climate Extremes Committee (Shein, 2009) expects the truly giant and gargantuan hailstones to have cohesive ice layers which indicate that the stone grew primarily as one progressively larger stone.

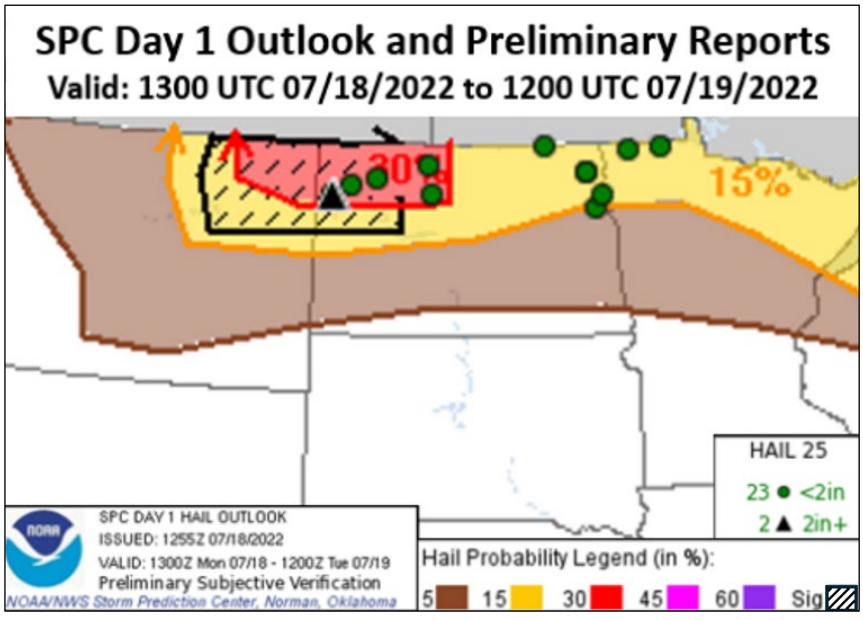
Figure 4.6-14. During the outlook or forecast stages, the NWS produces a variety of nationally and locally scaled severe summer weather hazard guidance – scalable to each specific hazard element. These are typically used in agency briefings, social media posts, and briefing support packages produced by the NWS offices in Bismarck and Grand Forks (NWS-BIS, 2022).

Figure 4.6-14: The NWS/SPC Severe Storm Hazard Map, 18 Jul 2022

Source: NWS-BIS, 2022

The Severe Hail Hazard Map shown in **Figure 4.6-15**, depicts the local threat of severe hail for specified areas, as a subset of the overall severe summer threat discussed above (NOAA NWS, 2023). The hail map assigns a severe hail hazard level ranging from low or non-threatening to expected or widespread, regarding the probability of hail of 1 inch diameter or larger within 25 miles of any point. An additional "hatched-black" level is used to identify any area with a risk of 2-inch diameter or greater (significant) hail within 25 miles of any point.

Figure 4.6-15: The NWS/SPC Severe Hail Hazard Map, 18 Jul 2022



Source: Adapted from SPC, 2023

Together, the Severe Hail Hazard Map and the TORRO Hailstorm Intensity Scale, as described below, can help predict damage potential to a specified area, based on either the *forecast* hail threat or *observed* hail reports.

The Tornado and Storm Research Organisation (TORRO), based in Great Britain, developed a Hailstorm Intensity Scale (H-Scale) in 1986 which is used primarily in Great Britain and Ireland, but may needs some adjustment for usage in other countries (Webb and Elsom, 2015). Like the NWS size scale, the H-scale also allows for the use of either direct measurement or comparison to common objects as a method of determining hail size in the field. As shown in **Figure 4.6-16**, the H-Scale extends from H0 to H10 with its increments of intensity/damage potential related to hail size (distribution and maximum), texture, numbers, fall speed, speed of storm translation and strength of the accompanying wind.

Figure 4.6-16: The TORRO Hailstorm Intensity Scale

Scale	Intensity Category	Typical Hail Diameter (mm)*	Probable Kinetic Energy **J m^{-2}**	Typical Damage Impacts
H0	Hard Hail	5	0-20	No damage
H1	Potentially Damaging	5-15	>20	Slight general damage to plants, crops
H2	Significant	10-20	>100	Significant damage to fruit, crops, vegetation
H3	Severe (U.S., thru 2009)	20-30	>300	Severe damage to fruit and crops, damage to glass and plastic structures, paint and wood scored
H4	Severe (U.S., aft 2010)	25-40	>500	Widespread glass damage, vehicle bodywork damage
H5	Destructive	30-50	>800	Wholesale destruction of glass, damage to tiled roofs, significant risk of injuries
H6	Destructive	40-60		Bodywork of grounded aircraft dented; brick walls pitted
H7	Destructive	50-75		Severe roof damage, risk of serious injuries
H8	Destructive	60-90		Severe damage to aircraft bodywork
H9	Super Hailstorms	75-100		Extensive structural damage. Risk of severe or even fatal injuries to person caught in the open
H10	Super Hailstorms	>100		Extensive structural damage. Risk of severe or even fatal injuries to person caught in the open

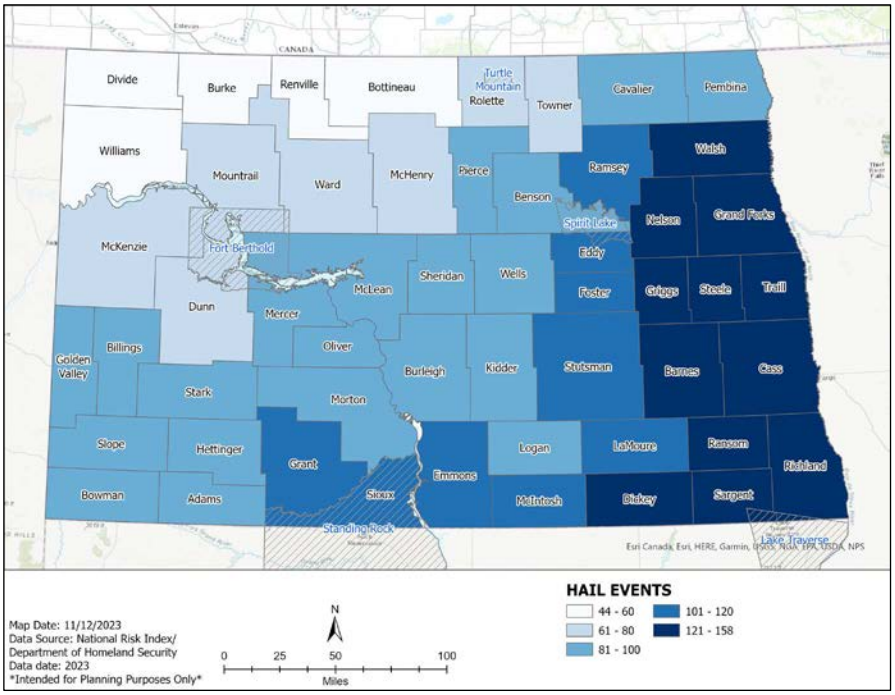
Source: Adapted from the Tornado and Storm Research Organization, 2023

TORRO (2023) research indicates that maximum hailstone size is the most important parameter relating to structural damage, especially toward the more severe end of the H-Scale. Hailstone shapes are also an important feature, especially as the "effective" diameter of non-spheroidal specimens should ideally be an average of the coordinates. In addition to this effective diameter, one should also consider the overall volume of the hail and the effect of storm induced winds when adjusting for the final H-Scale rating. Given our example at the bottom of page 3 of this section, widespread golf-ball sized hail (1.75 inches or 44.5 mm) would be considered quite destructive at an H5 rating. That same hail coupled with damaging winds of 60-80 mph might push the effective rating to H6 or H7. Whereas the occurrence of primarily nickel to quarter sized hail with only a few incidental golf-balls may rate as only an H4.

The TORRO Hailstorm Intensity Scale is a useful tool to anticipate damage extent in a specific location or area of occurrence based on size distribution, as a starting point, with adjustment as suggested above.

Figure 4.6-17 shows the number of severe hail events as reported by local NWS offices to the NCEI Storm Events Database and collected from the NWS Storm Prediction Center's data server for the 34-year period from 1986 through 2019 (NRI, 2023). The raw data as incorporated directly into the National Risk Index (NRI) analysis includes a mix of 3/4 inch or greater hail reported as severe, through 2009, and 1 inch or greater hail after 2009. The county-scale analysis shows a risk gradient heavily weighted to the southern and eastern portions of the state. Note that the NCEI database of hail reports extends back to 1955, but this analysis only includes reports since 1986, when more rigorous data collection practices were used.

Figure 4.6-17: National Risk Index/NCEI Hail Events in ND, 1986-2019



Source: NRI, 2023

- **Sustained Wind** is currently defined as the 2-minute average of 3-second winds and may be reported at any interval from 2 to 60 minutes, depending on the observing platform.

- **Wind Gust** is the instantaneous wind speed, often quantified as the highest 3-second wind during the corresponding 2-minute period.

- **Peak Wind or Gust** may be reported as the highest wind gust recorded within a given hour and may also be carried as the highest wind gust recorded during an entire day. *(NOAA, 1998; Gust, 2022)*

Strong/Damaging Wind. Strong (NRI) or damaging wind (NWS) is defined as a measured or estimated ***wind gust*** of 50 knots (58 mph) or greater, or damage commensurate with such winds, resulting from convective storms (NWS Severe Weather Product Specifications, 2023). Most wind sensors measure winds at one second intervals, but due to the response times of various types of sensors, the 3-second average of those readings are used (NOAA, 1998; Gust, 2022). Previous to the current 3-second wind gust standard a 5-second standard was in use, largely due to the heavier and thus slower to respond anemometer cups then in use.

The Federal Meteorological Handbook Number FMH-1 (OFCM, 2019) identifies standards for surface based meteorological observations across all federal agency programs, in coordination with the World Meteorological Organization (WMO) and International Civil Aviation Organization (ICAO).

Sustained wind speed, or wind power, can be estimated using the Beaufort scale. The Beaufort scale, shown in **Figure 4.6-18**, below, rates wind speed based on the observable impacts to the environment. The sustained wind scale ranges from calm (level 0), with no observable impacts, to hurricane strength (level 12),

which is sustained wind at 64 kts (74 mph) or above. Damage begins to occur around Beaufort number 9, with sustained winds at 40 kts (47 mph) or greater (NWS Northern Indiana, 2023). Hurricane winds exceed these numbers and are best described with the Saffir-Simpson scale.

Figure 4.6-18: Beaufort Wind Scale – Sustained Wind

Beaufort Number	MPH Range	MPH Average	Terminology	Description
0	0	0	Calm	Calm. Smoke rises vertically.
1	1-3	2	Light air	Wind motion visible in smoke.
2	4-7	6	Light breeze	Wind felt on exposed skin. Leaves rustle.
3	8-12	11	Gentle breeze	Leaves and smaller twigs in constant motion.
4	13-18	15	Moderate breeze	Dust and loose paper is raised. Small branches begin to move.
5	19-24	22	Fresh breeze	Smaller trees sway.
6	25-31	27	Strong breeze	Large branches in motion. Whistling heard in overhead wires. Umbrella use becomes difficult.
7	32-38	35	Near gale	Whole trees in motion. Some difficulty when walking into the wind.
8	39-46	42	Gale	Twigs broken from trees. Cars veer on road.
9	47-54	50	**Severe gale**	**Light structure damage.**
10	55-63	60	**Storm**	**Trees uprooted. Considerable structural damage.**
11	64-73	70	**Violent storm**	**Widespread structural damage.**
12	74-95	90	**Hurricane**	**Considerable and widespread damage to structures.**

Source: NWS Northern Indiana, 2023

Figure 4.6-19. Damaging wind gusts are measured with available surface wind sensors or estimated based on any combination of observed and reported phenomena, using either the Beaufort wind scale or the Wind Gust damage scale as specified by the NWS Instruction for Storm Data Preparation (NWSI 1605, 2021). Notice that a wind gust of 50 kts (58 mph) or greater often produces damage commensurate to a sustained wind of around 40 kts (47 mph) or greater. Otherwise, a sustained (2-minute or longer) thunderstorm outflow wind, as referenced on the Beaufort wind scale, will likely produce considerably more damage than an identical wind gust of only 3-second duration, based on the wind gust damage scale.

As previously mentioned, microburst wind patterns tend to radiate out from a central location, while larger scale downburst or straight-line winds tend to produce damage primarily in the direction of storm motion (NWS-SJT, 2023). For either type of wind damage pattern, the basics for probable wind speed estimation remain the same. When storms produce extreme wind damage a tornado may be suspected, and it may be necessary for a trained wind expert to sort out the evidence.

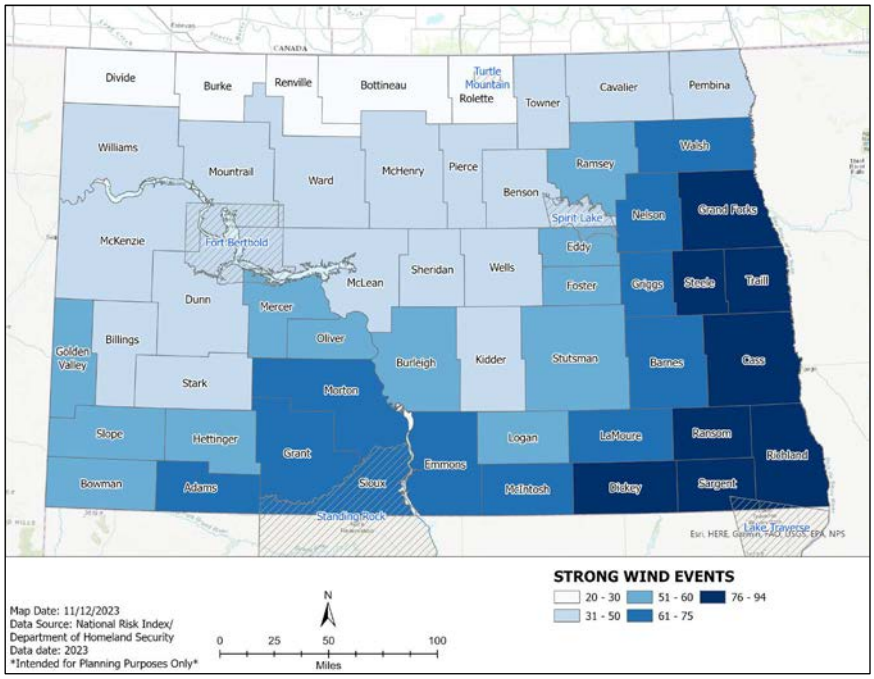
Figure 4.6-19: Estimating Wind Speed From Damage – Wind Gust

Wind Speed	Observations
26-38 kts (30-44 mph)	Trees in motion. Light-weight loose objects (e.g., lawn furniture) tossed or toppled.
39-49 kts (45-57 mph)	Large trees bend; twigs, small limbs break, and a few larger dead or weak branches may break. Old/weak structures (e.g., sheds, barns) may sustain minor damage (roof, doors). Building partially under construction may be damaged. A few loose shingles removed from houses. Carports may be uplifted; minor cosmetic damage to mobile homes and pool lanai cages.
50-64 kts (58-74 mph)	Large limbs break; shallow rooted trees pushed over. Semi-trucks overturned. More significant damage to old/weak structures. Shingles, awnings removed from houses; damage to chimneys and antennas; mobile homes, carports incur minor structural damage; large billboard signs may be toppled.
65-77 kts (75-89 mph)	Widespread damage to trees with trees broken/uprooted. Mobile homes may incur more significant structural damage; be pushed off foundations or overturned. Roof may be partially peeled off industrial/commercial/ warehouse buildings. Some minor roof damage to homes. Weak structures (e.g., farm buildings, airplane hangars) may be severely damaged.
78+ kts (90+ mph)	Many large trees broken and uprooted. Mobile homes severely damaged; moderate roof damage to homes. Roofs partially peeled off homes and buildings. Moving automobiles pushed off dry roads. Barns, sheds demolished.

Source: NWSI 10-1605, Storm Data Preparation, 2023

Figures 4.6-20 shows the number of strong/damaging wind events (convective wind gusts GTE 58 mph) as reported by local NWS offices to the NCEI Storm Events Database and collected from the NWS Storm Prediction Center's data server for the 34-year period from 1986 through 2019 (NRI, 2023). The raw data as incorporated directly into the National Risk Index (NRI) analysis includes wind gust reports of 58 mph or greater and wind damage reports determined to be consistent with such wind gusts. The county-scale analysis shows a risk gradient heavily weighted to the southern and eastern portions of the state, in similar fashion to the severe hail reports during the same period, as illustrated in Figure 4.6-18.

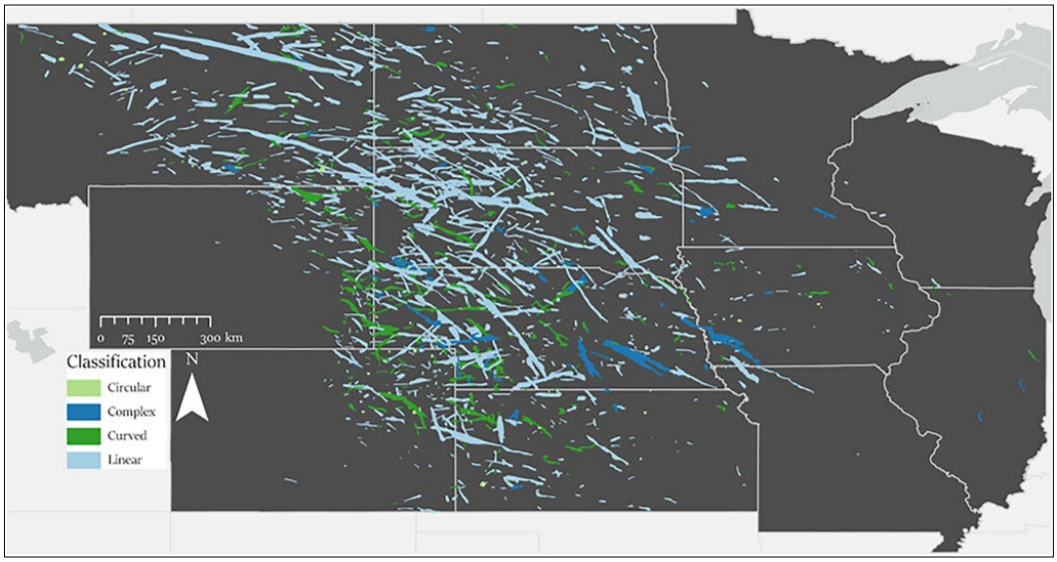
Figure 4.6-20: National Risk Index/NCEI Strong Wind Events in ND, 1986-2019



Source: NRI, 2023

According to Bell et al, (2023), severe hail and severe wind gusts display a similar spatial distribution, since the deep convective thunderstorm processes which produce strong storm updraft and large hail often produce strong storm downdraft, as the mass of water and ice loading in the thunderstorm collapses to the surface. As shown in **Figure 4.6-21**, Large Hail and Wind Damage Swaths (HWDSs) which are often produced across the Northern Plains states are often detectable by post-storm review of satellite imagery.

Figure 4.6-21: Hail and Wind Damage Swaths Identified via Satellite, May-Aug, 2000-2020.



Source: Bell et al., 2023

Tornadoes. As the first significant tornado damage location surveyed by Dr. Ted Fujita, the 1957 Fargo Tornado was instrumental in the subsequent development of the Fujita Scale (F-Scale) damage rating systems, published in 1971 (NWS-FGF, 2023). Dr. Fujita was the first to use detailed analysis of photographs and 8mm video, those taken of the Fargo tornado, and his on-scene survey of the tornado damage to relate damage to the probable wind speeds (Rossi, 2021). Fujita also used this video and photographic evidence to better understand the formation and function of the various vortices that form tornadoes. He was the first to recognize that multiple smaller funnel clouds may spin around or within a central vortex, creating odd hit-and-miss damage patterns.

Figure 4.6-22. The Enhanced Fujita Scale (EF-Scale), employed since 2007, is an update to Dr. Fujita's original work that incorporated decades of additional testing and the review of numerous additional tornadoes over time (Lerner, 2020; NWS-OUN, 2023). Like the original F-Scale, the determination of wind speed is based on the damage it produced, since wind sensors rarely survive a direct tornado strike. Thus, the damage produced from an F5 tornado is equivalent to an EF5 tornado, even though the derived wind speeds are now somewhat different.

Figure 4.6-23 shows the types of wind damage indicators which are currently used to assess damage and determine the range of probable wind speeds (NWS-OUN, 2023). Research leading to the development of more agriculture and rural based indicators suitable for North Dakota is ongoing.

Figure 4.6-22: Enhanced Fujita Scale (EF-Scale)

EF SCALE	
EF Rating	**3 Second Gust (mph)**
0	65-85
1	86-110
2	111-135
3	136-165
4	166-200
5	Over 200

Source: NWS-OUN, Norman OK, 2023

Figure 4.6-23: Enhanced Fujita Scale Damage Indicators

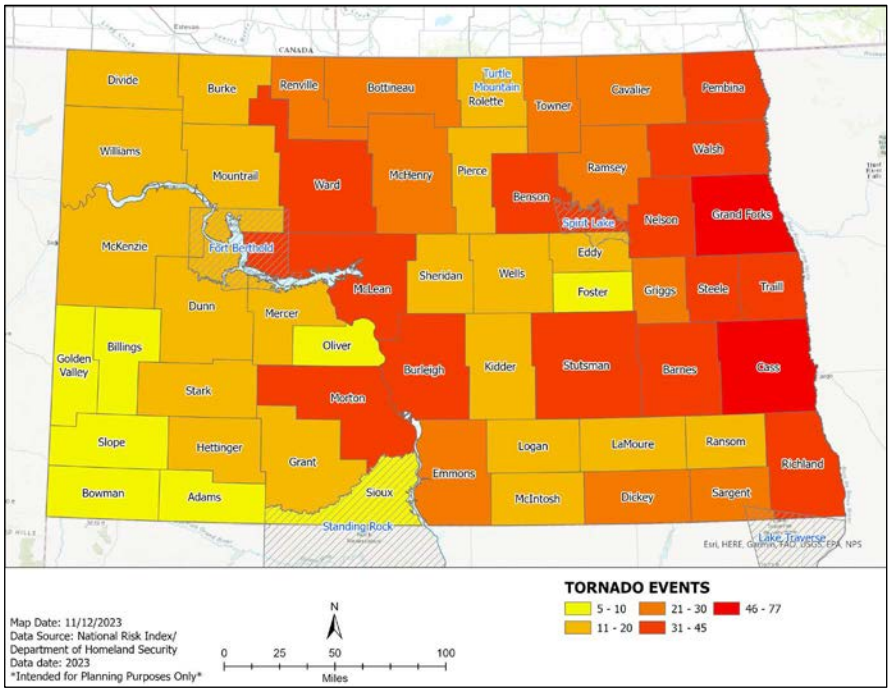
NUMBER (Details Linked)	DAMAGE INDICATOR
1	Small barns, farm outbuildings
2	One- or two-family residences
3	Single-wide mobile home (MHSW)
4	Double-wide mobile home
5	Apt, condo, townhouse (3 stories or less)
6	Motel
7	Masonry apt. or motel
8	Small retail bldg. (fast food)
9	Small professional (doctor office, branch bank)
10	Strip mall
11	Large shopping mall
12	Large, isolated ("big box") retail bldg.
13	Automobile showroom
14	Automotive service building
15	School - 1-story elementary (interior or exterior halls)
16	School - jr. or sr. high school
17	Low-rise (1-4 story) bldg.
18	Mid-rise (5-20 story) bldg.
19	High-rise (over 20 stories)
20	Institutional bldg. (hospital, govt. or university)
21	Metal building system
22	Service station canopy
23	Warehouse (tilt-up walls or heavy timber)
24	Transmission line tower
25	Free-standing tower
26	Free standing pole (light, flag, luminary)
27	Tree - hardwood
28	Tree - softwood

Source: NWS-OUN, Norman OK, 2023

Prior to and concurrent with his groundbreaking tornado studies, Dr. Fujita and his numerous students and research partners have also been responsible for identifying the damage patterns associated with various types of downburst wind phenomena (Lerner, 2020; Rossi, 2021). Fujita's explanations of these phenomena and the specific terminology he developed over time, are largely still in use today.

Figure 4.6-24 shows the distribution of tornado touchdowns and/or tornado path segments as reported by local NWS offices to the NCEI Storm Events Database. Events were collected from the NWS Storm Prediction Center's data server for the 34-year period from 1986 through 2019 and incorporated directly into the National Risk Index analysis (NRI, 2023).

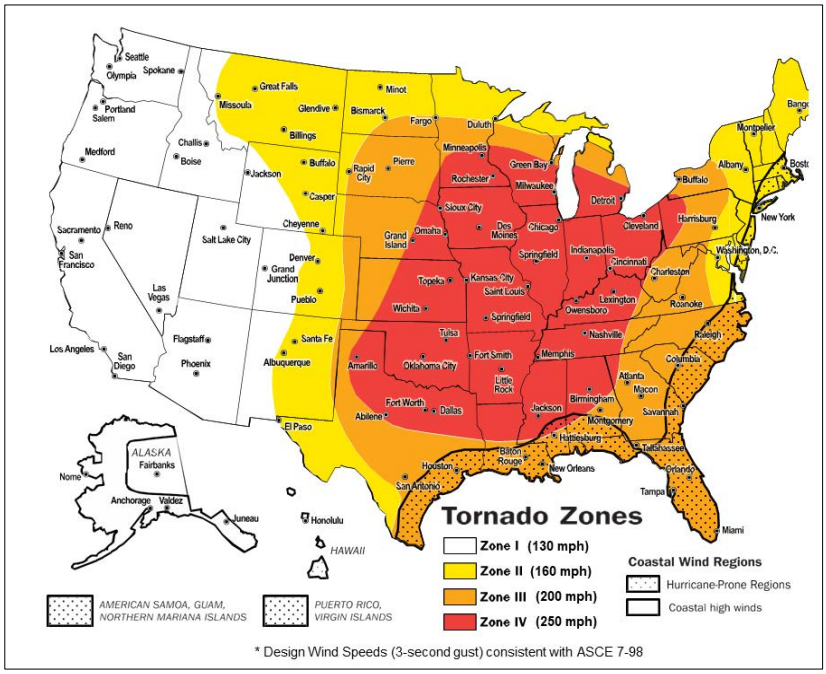
Figure 4.6-24: National Risk Index/NCEI Tornado Events in ND, 1986-2019.



Source: NRI, 2023

The raw data includes all tornadoes rated from EFO-EF5, including those rated EF-Unknown (EFU) due to lack of suitable damage indicators. This county-scale analysis covers the identical time period used for large hail and damaging winds, as shown in Figures 4.6-18 and 4.6-21. The tornado analysis shows a somewhat different risk gradient than hail or wind and appears to correspond highly with the summertime distribution of population in the state (NRI, 2023). Most tornadoes have a much smaller but more intense damage path than accompanying hail or damaging winds, and higher population areas increase the possibility of detection and reporting of the phenomena along with the increased evidence of structural damages used to distinguish tornado damage from other wind damage phenomena.

Figure 4.6-25: Tornado and Extreme Wind Risk Map



Source: Adapted from FEMA, P-320, 2021

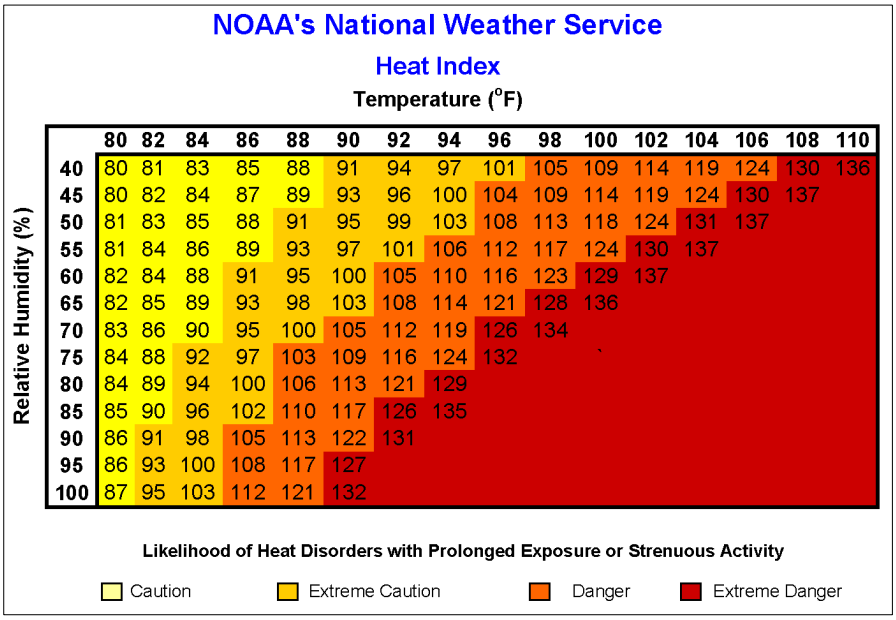
The tornado risk and extreme wind zones for the nation are displayed in **Figure 4.6-25**. East and south of Bismarck there is an elevated wind risk zone as compared to the rest of the state, and one would expect an elevated number of tornadoes based on NOAA NCEI data and the 2020 International Code Council Standards (FEMA, 2021). Most North Dakota

tornadoes occur during the peak summer vacation season, June through August, which can factor into recreational planning. This can result in large numbers of people in campers, tents or cabins that are considered inadequate as storm shelters, may be more prone to damage, and which put occupants at an increased risk of serious injury or death.

Excessive Heat or Heat Wave is a severe summer hazard type that is not directly related to thunderstorms. However, the hot and humid conditions which give rise to excessive heat often precede the formation of strong to severe thunderstorms, over periods of hours to days.

The Heat Index is a measure of how hot it really feels when relative humidity is factored in with the actual air temperature (NWS, 2023), as shown by the chart at **Figure 4.6-26**.

Figure 4.6-26: NOAA NWS Heat Index Chart



Source: NOAA, 2023

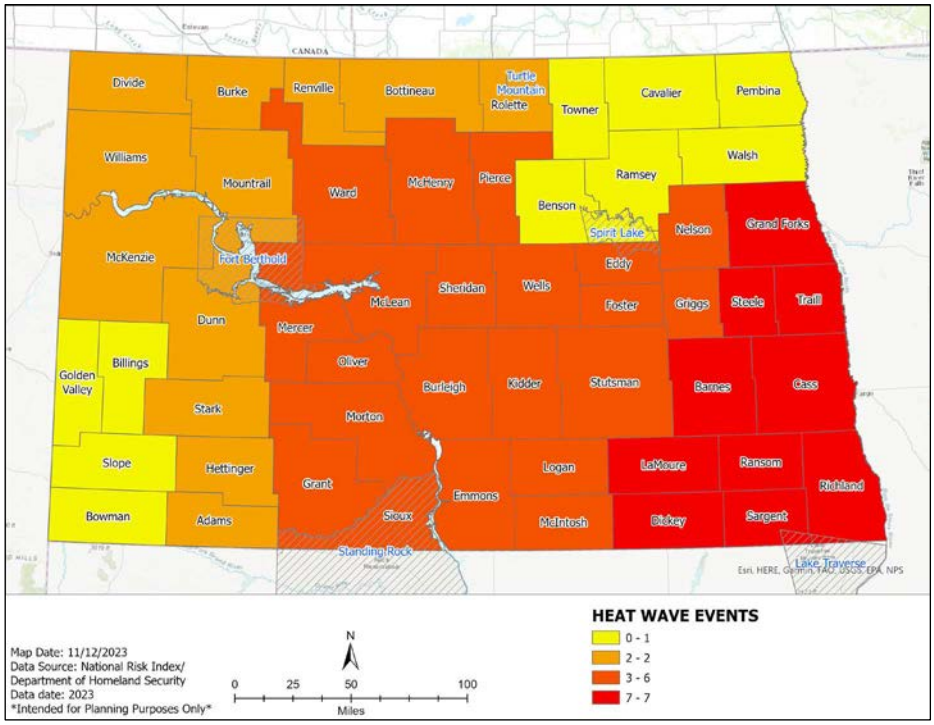
The NWS offices serving North Dakota currently issue an Excessive Heat Warning when the heat index is expected to exceed 105 degrees Fahrenheit over multiple counties for a period of multiple hours, and the overnight low temperature is expected to stay at or above 75F (NWS-CRH, 2019). This chart color codes the heat index based on the level of risk to human health under strenuous activity.

The spatial extent for Heat Wave events as characterized in FEMA's National Risk Index (NRI), is shown in **Figure 4.6-27**. According to the NRI (2023), the data extends through the 16 summer seasons from 12 November 2005 through 6 October 2022 and is based on the NWS warnings which were issued for *excessive heat*, with any warned period of 6 hours or more in a calendar day counting as an event.

Similarly, the NOAA NCEI Storm Events Database tracks the occurrence of a Heat Wave events as either *heat* (1996 through Oct 2005) or *excessive heat* (Nov 2005 through present) event categories, with excessive heat simply being an updated naming convention. North Dakota's reported heat/excessive heat events are shown in **Figure 4.6-28**, as collected in the NCEI database for the 28 summer seasons since 1996 (NCEI, 2023). In the NCEI database, each event can span multiple days while the NRI database counts each event day separately. Otherwise, if compared over the same period (2006 through 2022) the spatial and numeric patterns would be identical, with the highest frequency of excessive heat days being in east-southeast ND, where high humidity is most common.

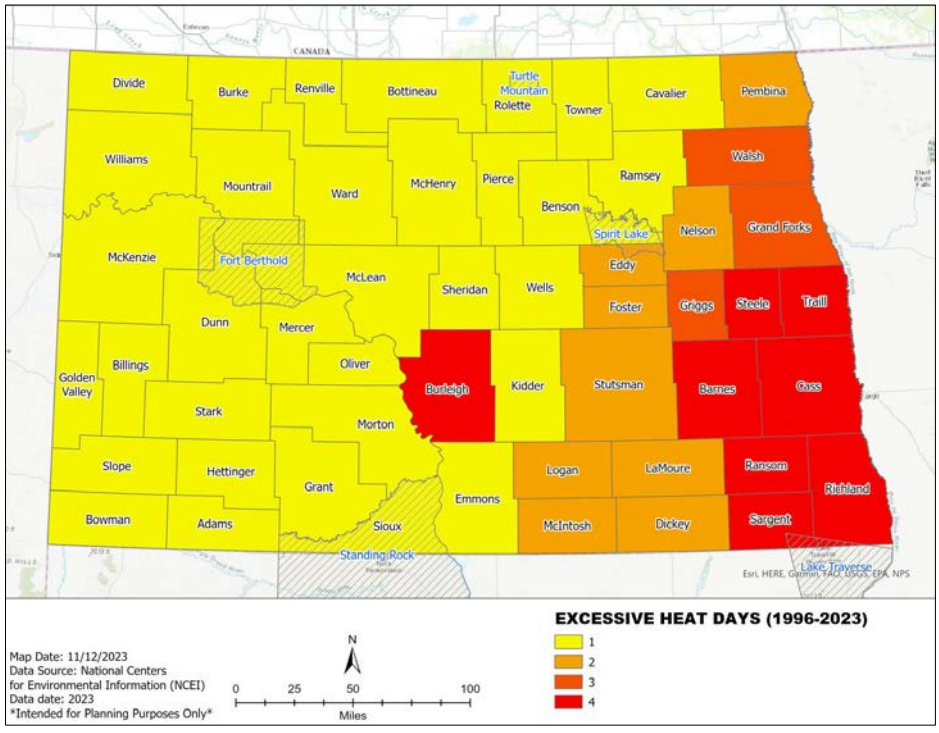
During the NCEI's 28-year database period for heat/excessive heat, with both terms using identical criteria, there were four distinct episodes recorded. One ran intermittently from August 3 through 7 of 2001, affecting 25 counties for 1 to 3 days each. One ran intermittently from July 16 through 20 of 2011, affecting 47 counties (all but the far northeast) for 1 to 5 days each (NCEI, 2023). The second and third were each one day, 20 July 2016 and 21 July 2020, and only affected counties in east or southeast ND.

Figure 4.6-27: NRI Heat Wave Events in North Dakota, 2005-2022



Source: NRI, 2023

Figure 4.6-28: NCEI Heat/Excessive Heat Events in North Dakota, 1996-2023



Source: NCEI, 2023

Figure 4.6-29 is an overview of the spatial extent for severe summer weather.

Figure 4.6-29: Spatial Extent for Severe Summer Weather

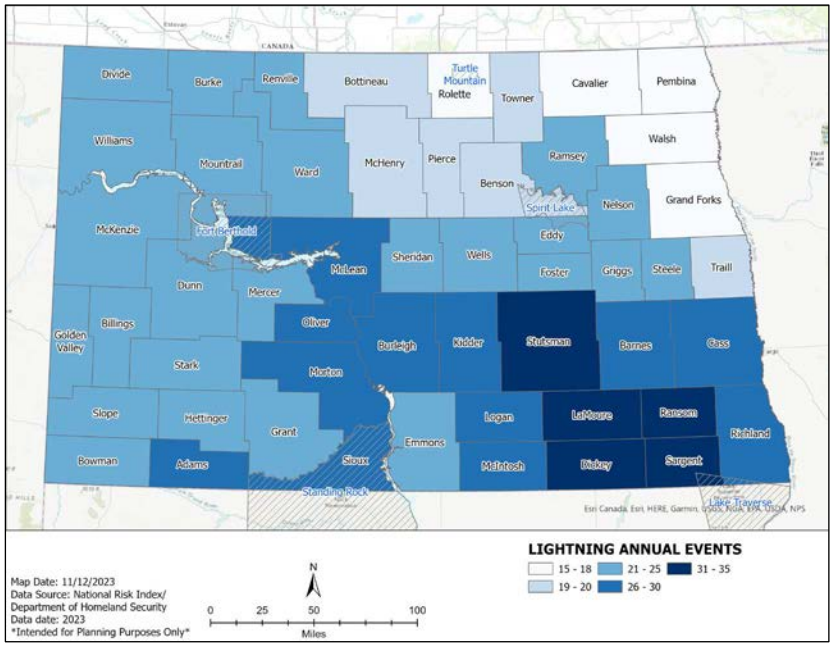
Resource	Extent
Public	Regional
First Responders	Regional
Delivery of Service and Continuity of Operations	Regional
Property, Facilities, and Infrastructure	Local
Environment	Local
State Economy	Statewide
Public Confidence in the State's Governance	Statewide

4.6.1.4 Probability

Lightning has a high certainty of occurring in any county, in any given year, and with any type of thunderstorm. Most other severe summer hazards occur less frequently as part of the larger, more organized severe thunderstorms like squall lines and supercells, such as large hail, strong/damaging winds, and tornadoes. While Excessive Heat generally precedes or is otherwise independent of the development of widespread thunderstorm activity.

Figure 4.6-30 shows Cloud-to-Ground (CG) lightning strikes from the NCEI CG Lightning Strike database. The Lightning Strike database, as used in NRI analyses, provides a more comprehensive treatment of the lightning hazard as it addresses the potential for damaging strikes, in contrast with the NCEI Storm Events Database which only lists reported damages. This figure displays the anticipated annual lightning events per 4x4 km grid block within each county. According to NRI (2023), the southeast has the most with several counties exceeding 31 events per 4x4 grid per year, while the northeast has 18 events or fewer per 4x4 km grid.

Figure 4.6-30: NRI/NCEI Annual Cloud-to-Ground Lightning Events in ND

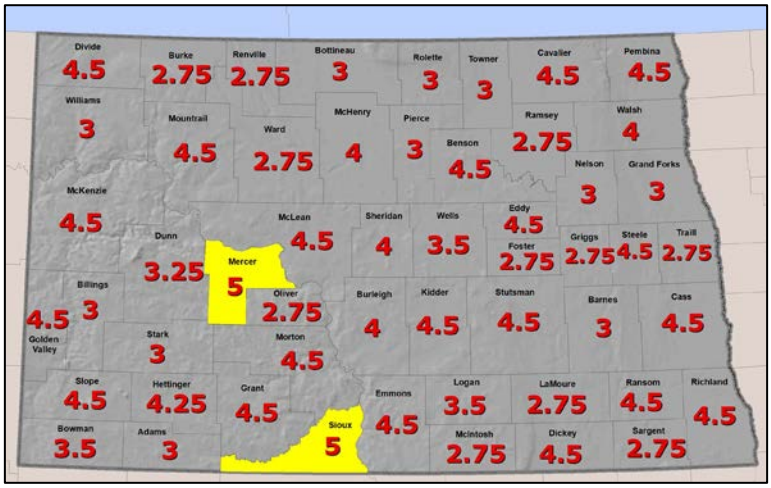


Source: NRI, 2023

Even though the Lightning Strike database only extends from 1991 through 2012, researchers haven't found a noticeable increase in overall thunderstorm activity over the more recent decade (Schumacher & Rasmussen, 2020). As discussed later in this section, a subtle increase in thunderstorm activity is expected through the end of this century, due primarily to an expected increase in areal coverage of each thunderstorms (Jessup & Burke, 2018).

Figure 4.6-31 shows the largest hailstone recorded in each ND county. Every county has experienced baseball size hail (2.75 inch) or larger, since record keeping began in 1955. According to the NCEI Storm Events Database (2023), there have been 1,093 large hail (GTE 1 inch) events in the state for the 5-year period, 2018-2022, for an average of 219 events per year, or 4 events per average sized ND county per year. Over 24 percent (267) had more destructive hail of golf ball (1.75 inch) or larger size. But even small, wind driven hail can cause significant crop loss.

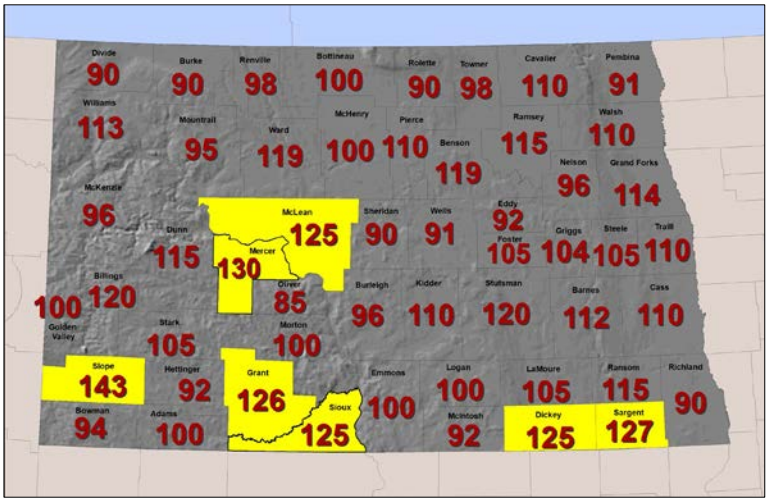
Figure 4.6-31: Largest Hailstones in Inches by County, 1955-2023



Source: NOAA NWS Bismarck, 2023

Figure 4.6-32 shows the highest thunderstorm wind gust for each county in North Dakota.

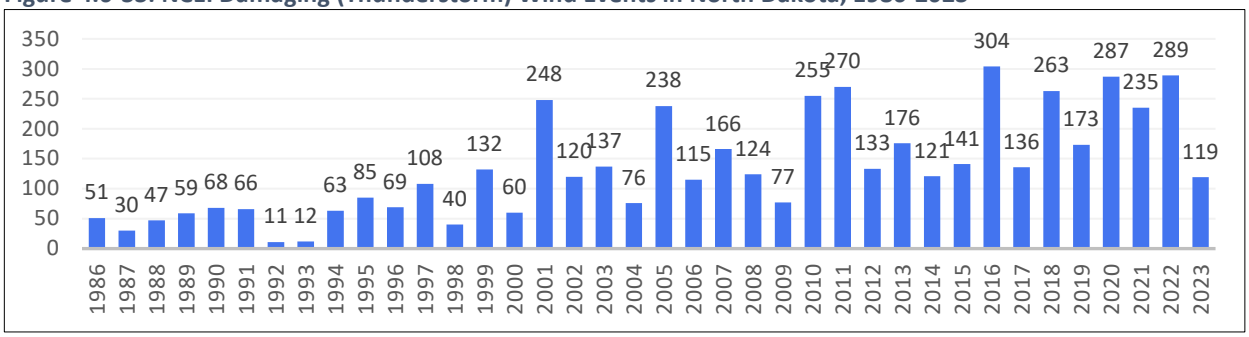
Figure 4.6-32: Highest Non-Tornadic Wind Gust by County, 1955-2023



Source: NOAA NWS Bismarck, 2023

Figure 4.6-33 shows the number of damaging thunderstorm wind events in the NCEI database since 1986, when more modern reporting practices began. The apparent increase in reported damaging wind events, is in part due to the increased summer precipitation following the drought of the late 80s and early 90s, and the explosive growth in reliable automated wind sensors which has taken place this century (NDAWN, 2023). When considering events since 2000, there has been an average of 178 reported damaging wind events each year (NCEI, 2023). For the 2018 through 2022 period, that rate had increased to 249.4 reported events per year.

Figure 4.6-33: NCEI Damaging (Thunderstorm) Wind Events in North Dakota, 1986-2023



Source: NCEI, 2023

Tornadoes in the Northern Great Plains can be small, relatively weak, and/or cross over the many large open country areas causing little to no discernable damage. Or they can be larger, longer tracking, more violent, and especially damaging as they cross counties and communities. Very large, even multi-vortex tornadoes can absolutely devastate rural properties and communities alike, like the Fargo F5/EF5 of 1957.

Figure 4.6-34 shows the annual frequency of occurrence of tornadoes in the state from 1950 through 2022 (NCEI, 2023). Weak EF0-EF1 tornadoes, those that produce less significant damage, occur frequently at 18.8 times per year. Strong EF2-EF3 tornadoes, those that produce significant damage but few deaths, occur less frequently at around 2.6 times per year. While violent EF4/EF5 tornadoes, those producing extreme damage and a high risk of serious injury or death, are rarer with one expected every 4 years.

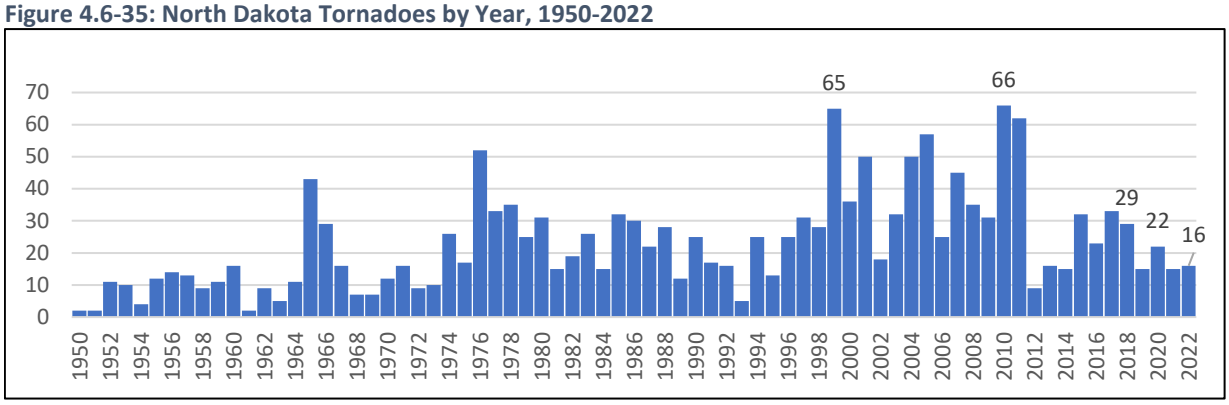
Figure 4.6-34: Annual Tornado Frequency since 1950, by EF Rating

Magnitude	Frequency
EF0/F0	13.4 per year
EF1/F1	5.4 per year
EF2/F2	2.0 per year
EF3/F3	0.6 per year
EF4/F4	0.2 per year
EF5/F5	0.04 per year

Source: NCEI, 2023

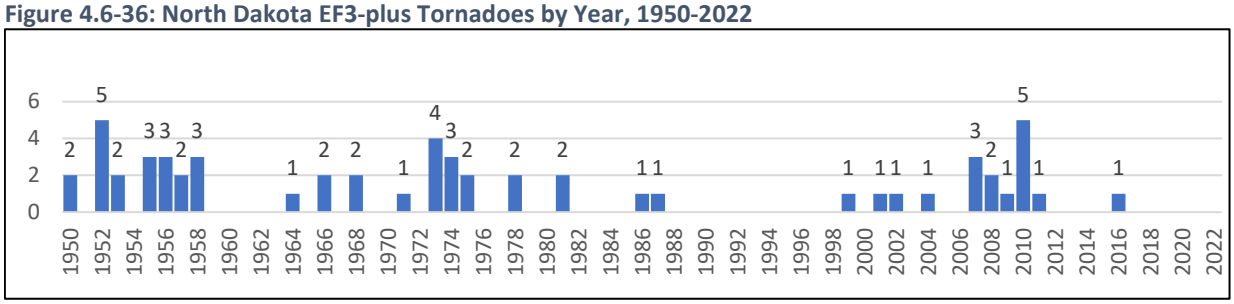
Looking at tornadoes as a whole, **Figure 4.6-35** shows tornadoes by year, while **Figure 4.6-36** shows tornadoes rated EF3 or above. The peak years of these two data sets are not always the same, which means that severely damaging tornadoes can occur even in years with few overall tornadoes – it really depends on what the tornado is able to hit! Early in the data (1950s, 1960s) a larger proportion of tornadoes were severely damaging (NCEI, 2023), possibly because there was a more uniform distribution of rural homesteads. According to Gensini and Brooks (2018), this discrepancy may also be due, in part, to the availability of better tornado detection technology and reporting mechanisms in more recent years, leading to a much higher detection and reporting of weaker or shorter-lived events.

Figure 4.6-35: North Dakota Tornadoes by Year, 1950-2022



Source: NCEI, 2023

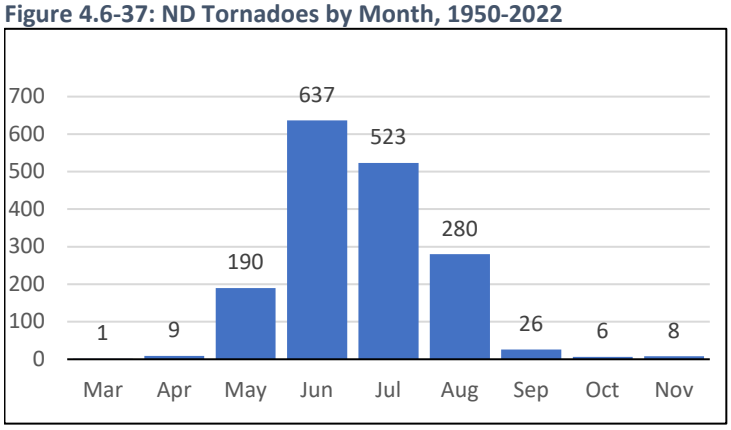
Figure 4.6-36: North Dakota EF3-plus Tornadoes by Year, 1950-2022



Source: NCEI, 2023

June is the peak month for tornadoes in North Dakota, as displayed in **Figure 4.6-37**, averaging close to 9 tornadoes per year, back to 1950. July runs a prominent second, averaging over 7 tornadoes per year, while August comes in third, averaging nearly 4 tornadoes per year. The typical tornado season runs roughly from mid-May through mid-September, with only mid-winter, December through February, having no recorded tornadoes in the state. As mentioned earlier in this section, North Dakota's earliest recorded tornado occurred in the early evening of March 26, 2003, while the latest tornadoes occurred through the mid to late afternoon of November 1, 2000.

Figure 4.6-37: ND Tornadoes by Month, 1950-2022



Source: NCEI, 2023

North Dakota has experienced 11 deadly tornadoes, as detailed in **Figure 4.6.38** (NCEI, 2023). According to NCEI (2023), the worst was the 1957 Cass County tornado that killed 10 North Dakotans and caused an estimated $25 million in property damage, the equivalent of nearly $274 million in 2023 dollars.

Figure 4.6-38: Deadly Tornadoes in North Dakota Since 1950

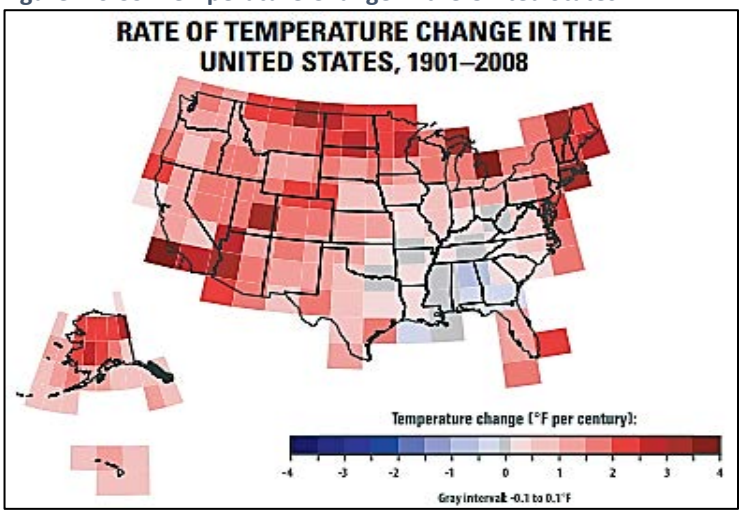
County	Date	Mag.	Deaths	Injuries	Property Damage	2023 equiv. Property Damage	Length	Width
Burleigh	7/1/1952	F4	1	25	$ 250,000	$2,822,358	19.8	150
Morton	5/29/1953	F5	2	20	$ 250,000	$2,811,748	7.4	600
Richland	7/2/1955	F4	2	19	$ 250,000	$2,801,217	9.1	150
Cass	6/20/1957	F5	10	103	$25,000,000	$273,728,647	27.4	500
Cavalier	6/24/1966	F1	1	1	$ 25,000	$237,400	0	33
Hettinger	6/29/1975	F4	1	4	$ 2,500,000	$14,296,979	45.8	880
Grant	7/4/1978	F4	5	35	$ 2,500,000	$11,797,200	26	250
Renville	7/23/1997	F2	1	2	$ 46,000	$88,180	0.2	30
Grand Forks	8/26/2007	EF4	1	18	$50,000,000	$74,194,085	5	1400
Ward	8/12/2010	EF3	1	1	$ 500,000	$705,486	2.48	400
McKenzie	7/9/2018	EF2	1	28	$ 3,500,000	$4,288,405	0.53	400

Source: NCEI, 2023

Figure 4.6-39 looks at increased rates of temperature change across the U.S., where North Dakota has one of the highest rates of change compared to the country as a whole. According to the U.S. Global Change Research Program (2021), in addition to creating more excessive heat events, this generates more severe weather, generally in the form of heavier precipitation and flooding.

Since 2018, NCEI reported one excessive heat event day, affecting only the 10 counties of east-central and southeast North Dakota, which were shown in Figure 4.6-28 as most likely to experience excessive heat. Since the beginning of such records, back in 1996, NCEI lists 7 days with excessive heat somewhere in the state, resulting in 25% risk for excessive heat at the state level, on any given year, and from 4% to 25% at the county level, depending on location in the state, as per Figure 4.6-28 (NCEI, 2023).

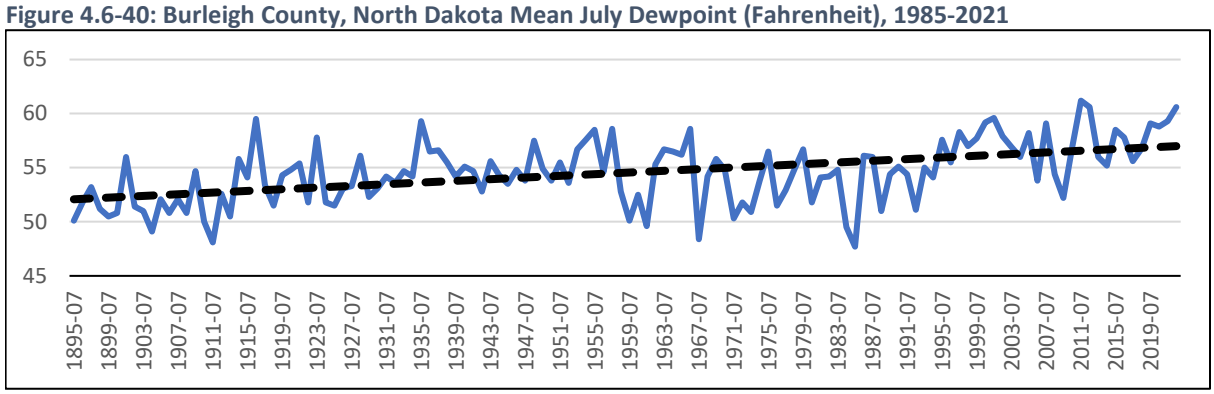
Figure 4.6-39: Temperature Change in the United States



Source: U.S. Global Change Research Program, 2021

For residents of the state, this number may seem low. **Figure 4.6-40** shows the mean July dewpoint in Burleigh County from 1895 through 2020, with a demonstrable increase evident in recent years (PRISM Climate Group,2023). A dewpoint is the temperature to which the air must cool to reach full saturation and form dew (Farmer's Almanac, 2023). When people colloquially discuss humidity in the summer, what they are usually referring to is the discomfort caused by a high dewpoint, resulting in a higher overall relative humidity, and the inability for their body to cool itself through the evaporation of sweat. Dewpoints exceeding 60 degrees Fahrenheit can make the summer heat feel thick (Farmer's Almanac, 2023). The first time the mean July dewpoint exceeded 60 degrees was in 2011 and it has not fallen below 55 degrees since. So, it's not just the heat, it's also the humidity!

Figure 4.6-40: Burleigh County, North Dakota Mean July Dewpoint (Fahrenheit), 1985-2021



Source: PRISM Climate Group, 2023

According to Gust (2021a), low-level heat and moisture serve as the fuel for developing powerful thunderstorms, with large hail, damaging downburst winds, and tornadoes.

Figure 4.6-41 provides an overview of the Severe Summer Weather component hazards and their probability as derived from the NCEI CG Lightning Strike database and the Storm Events Database (Storm Data). Lightning is by far the most common summer hazard, with several thousand CG strikes in an average county each year, though there are generally few reported significant damages or casualties. And excessive heat is the least frequent, with fewer than 1 event day per year, on average, and most often only affecting the east-southeast portions of the state.

Figure 4.6-41: ND Statewide Severe Summer Hazard Frequency, 2018-2022

Summer Hazard	Events	Annual Frequency
Lightning, CG Strikes (est.)	1,470,000	294,000
Damaging Tstm. Wind	1,247	249.4
Large Hail	1,093	218.6
Tornadoes	97	19.4
Excessive Heat	10	2* (< 1 event day per year)

Source: NCEI, 2023

The severe thunderstorm components of Damaging Wind and Large Hail typically go hand-in-hand, with 3 to 6 of each such event occurring in each average sized ND county, each year – accompanied by hundreds of Cloud-to-Ground lightning strikes. North Dakota is at the northern edge of the historical U.S. Tornado Alley, with about 1.5 times the number of tornadoes per unit area as the national average. Eastern North Dakota counties may average a tornado every 1 to 2 years, while western counties see tornadoes about half as frequently.

4.6.1.5 Warning Time and Duration

Outlook, to Watch to Warning, or Ready-Set-Go. The NWS Storm Prediction Center (SPC) is the national center tasked with coordinating severe weather awareness, forecasting, and alerting activities across the country. The SPC begins its forecasting of and messaging for severe summer weather 4 to 8 days prior to the event's arrival with a Day 4 through Day 8 Severe Weather Outlook. This outlook contains a map of areas in the contiguous 48 states where severe weather may be expected, along with a forecast discussion. According to NOAA SPC (2023), as the timeframe for severe weather nears to within three days, the Day 3, Day 2, and Day 1 Convective Outlooks give a more descriptive narrative and technical report of what is expected in terms of hail, thunderstorm wind, and tornado threats.

Local NWS offices in each state work closely with the SPC to provide consistent and accurate severe weather forecast information. Each local office provides high resolution detail and local expertise to the collaborative forecast process, which then feeds into the national scale analysis and forecast. Summer severe convective storms are generally "short-fused", meaning that they will often initiate development and quickly become severe, thus requiring a sharp eye and rapid response on the part of weather forecasters, emergency responders, and the public alike. Summer severe thunderstorms are generally sharply focused and very intense over township to county sized areas, over a fraction of an hour.

When atmospheric conditions in an area are favorable for these storms to develop within the next few hours, the SPC, in conjunction with the local forecast offices, will identify the counties most likely to be impacted and issue a severe thunderstorm watch. A watch is not a guarantee of severe weather in every sector of the watch, but it does establish a timing and encourages the public to be aware of this increased potential and to maintain a "Watch" for further severe storm developments. A watch area is generally 20,000 to 40,000 square miles, so the locations within the area that actually experience severe weather at any one time may be small, and the NWS is quick to clear areas from a watch when the threat for severe weather in that area has passed. According to NOAA SPC (2023), a watch includes graphics and text, a probability table and notification text for both counties and for aviation interests.

According to the NWS (2023), it is the explicit responsibility of the local NWS forecast offices to issue severe thunderstorm and tornado warnings when they determine these events are either imminent or occurring. They work directly with the broadcast media and with area dispatch centers to ensure their warnings are quickly and broadly distributed. They specify if and when the public should take certain safety precautions, which can include taking shelter in or avoiding travel through areas where severe weather is likely to be occurring. And they follow-up with local SkyWarn Storm Spotters, media sources, and emergency management officials to assess and document the outcomes of these storms.

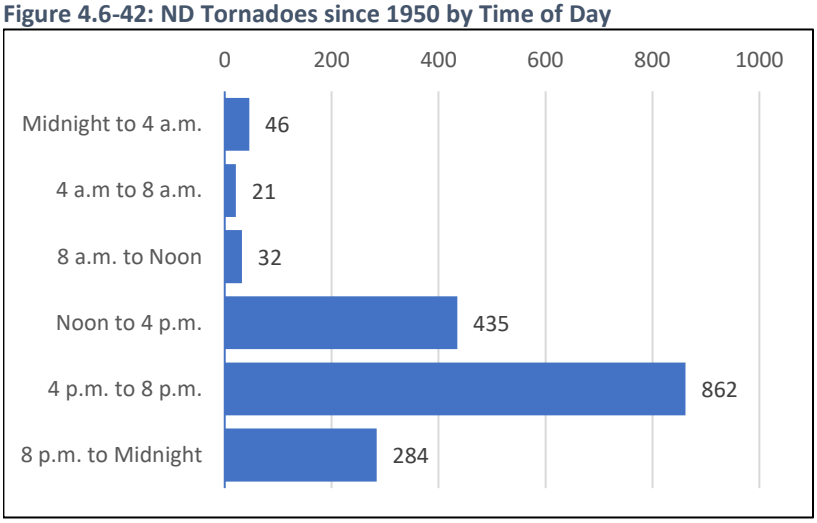
Excessive Heat and summertime High Wind Watches and warnings are examples of "long-fused" alerts issued by the local NWS offices, as well. These long-fused heat and wind episodes are similar to most severe winter storm and cold phenomena, that develop over a longer period pf time and generally impact much larger areas. A High Wind Watch is usually issued from 12 to 48 hours or more in advance of conditions that may include sustained winds of 40 mph (35 kts) or greater hour for at least an hour, or any gusts of 58 mph (50 kts) or greater that is outside of thunderstorm activity. According to the NWS (2023), a High Wind Warning is issued when those conditions are expected, not just possible, and is usually issued much closer to the event. A similar process and common vernacular are used to communicate the risk and need to prepare for excessive heat. At 24 to 72 hours out from the onset of dangerous heat conditions, the NWS local office will issue an Excessive Heat Watch, indicating that conditions are favorable for this hazard (NOAA, 2022). When the onset of high temperatures is less than a day out, Excessive Heat Warnings and/or Heat Advisories will be issued.

The NWS web site at *https://www.weather.gov/safety/heat-index* is dedicated to heat, heat safety, and heat impacts. In addition, *Heat.gov* is the website of the National Integrated Heat Health Information System (NIHHIS, 2023). The NIHHIS is a federal interagency information portal, created by NOAA and the CDC, to help integrate NWS heat related forecast and warning information with a wide array of other science and information-based agencies, to better coordinate public messaging across all sectors, and to help protect people from the many dangers of excessive heat.

Severe summer storms can occur at any time of day, and when compared to heat waves or winter season storms, they are generally short-lived over any one location. Most severe weather develops within the warm, moist, and convectively unstable sector ahead of an approaching cold frontal boundary (NOAA NSSL, 2023). Isolated storms or storm clusters may appear slow moving or nearly stationery over an area, but they can rapidly develop, and through either internal (downburst) or external (frontal) forcing, accelerate to speeds of 50 mph or greater.

Figure 4.6-42 shows that tornadoes in North Dakota can also occur at most any time of the day but are most common from the mid-afternoon through evening hours.

Figure 4.6-42: ND Tornadoes since 1950 by Time of Day



Source: NCEI, 2023

4.6.2 Consequence and Vulnerability Loss Analysis

This section describes the consequences and vulnerabilities of severe summer weather. Both consequences and vulnerability will be discussed in this section.

A consequence is the "degree of debilitating impact that would be caused by the incapacity or destruction of critical infrastructure or a critical function." Consequences can be tangible impacts to buildings or systems or intangible impacts on processes, business, or reputation. Consequences include debilitating impacts, such as the loss of critical functions, data, or public confidence. According to FEMA EMI (2023), it also includes cascading effects that may have an effect on functionality of critical services such as the loss of service of a utility or communications.

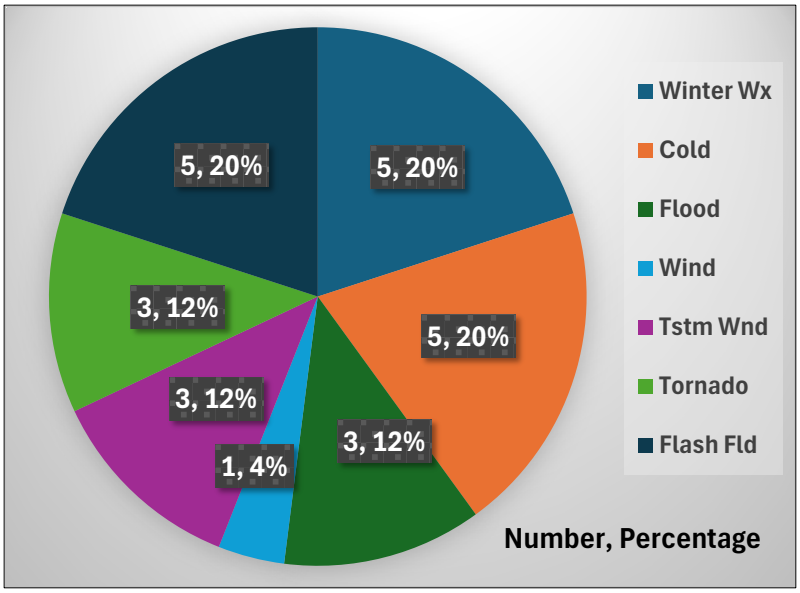
Vulnerability is "susceptibility to physical injury, harm, damage or economic loss." It considers the extent of injury and damage that may result from a hazard event of a given intensity in a given area. According to FEMA EMI (2023), this may be a geographic, social, or economic feature that makes harm from a hazard more likely or more intense.

4.6.2.1 Human Loss

Fatalities are a possible human consequence from severe summer weather. According to The Weather Channel's Brian Donegan (2019), and based on NCEI Storm Events Database, of all weather-related hazards, heat was the deadliest type of weather hazard for the U.S. during the 20-year period, 1999-2018. However, this varied greatly from one part of the country to another.

Figure 4.6-43 shows that more North Dakotans are killed by either extreme cold, winter storms, or flash flooding than any other type of weather, based on data compiled from the NCEI Storm Events Database for the same 20-year period of 1999-2018, as referenced (NCEI, 2023). During this period, ND had no reported fatalities that were directly related to the severe summer hazards of excessive heat, lightning, or hail.

Figure 4.6-43: North Dakota Weather Fatalities, 1999-2018



Source: NCEI, 2023

The severe summer weather hazards of tornadoes and damaging thunderstorm winds accounted for 6 deaths, with an additional death due to high winds (non-thunderstorm) that also occurred during the summer season (NCEI, 2023). This accounted for 7 reported fatalities, or 28 percent of the 20-year total, that were directly related to severe summer weather. If flash flooding is also included in the severe summer hazards, this accounts for 12 of 25 deaths, or 48 percent of the total.

Note that injuries or deaths due to either extreme cold or excessive heat are difficult to ascertain and are severely underrepresented in the NCEI database, given that the impacts of the heat or cold stress

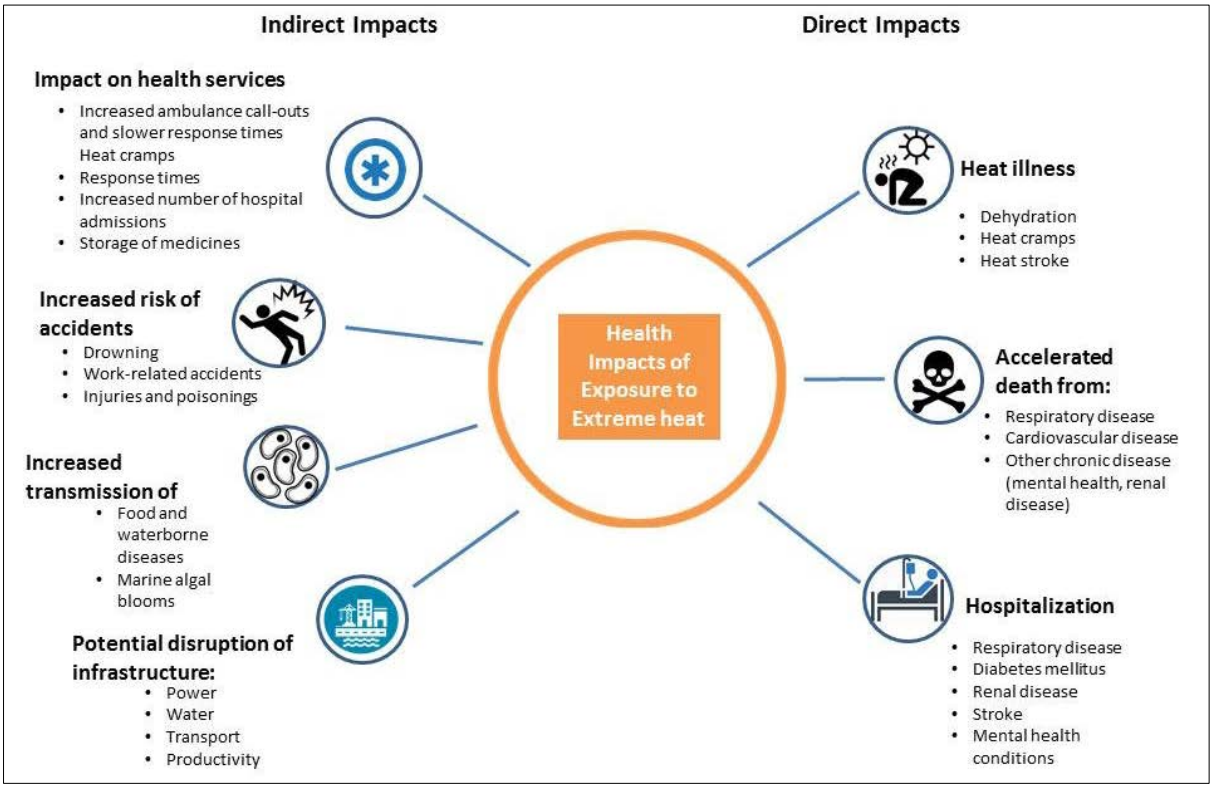
can manifest a week or more after the exposure (Vaidyanathan et al., 2020). Dr Vaidyanathan and the CDC collect and maintain a more robust database of morbidity (disease) and morbidity (death) provided by medical facilities across the country.

According to the CDC (2020), the average number of deaths for the period 2004-2018, where heat is the underlying cause, is around 415 persons per year, or roughly 1.34 deaths per million people. Similar CDC research shows that extreme cold deaths may be 3 to 4 times as common as excessive heat deaths (Benko et al., 2014). These CDC studies suggest that North Dakota may average at least one excessive heat caused death and 3 to 4 extreme cold deaths per year, most that go publicly unreported.

Figure 4.6-44 indicates that serious injury, hospitalization, and even death are potential direct impacts from excessive heat, according to the World Health organization (WHO). In addition, there are indirect impacts that can cause human suffering and death as well, including increasing the impacts from chronic disease, respiratory illness and cardiovascular disease and exacerbating the impacts of other diseases that can lead to hospitalization (WHO, 2018). Confusion, disorientation, and muscle spasms can lead to an increase in accidents. Heat also fosters faster growth and transmission of bacteria in food and water, increasing the transmission of illness from these sources.

With these impacts in mind, those who are already battling health issues are obviously one group that faces vulnerability from heat. However, excessive heat can trigger flare ups in autoimmune disorders as

Figure 4.6-44: Direct and Indirect Human Consequences for Excessive Heat



Source: World Health Organization, 2018

well (Chiavolini, 2023). It is not just the heat, but ultraviolet light from the sun and humidity that can serve as triggers for these chronic diseases. According to Chiavolini (2023), even those with well-managed symptoms may find that they struggle when the temperature or humidity gets high because of

the impact that heat can have on the brain and spinal cord, inability to repair cells damaged by the sun and swelling in the joints.

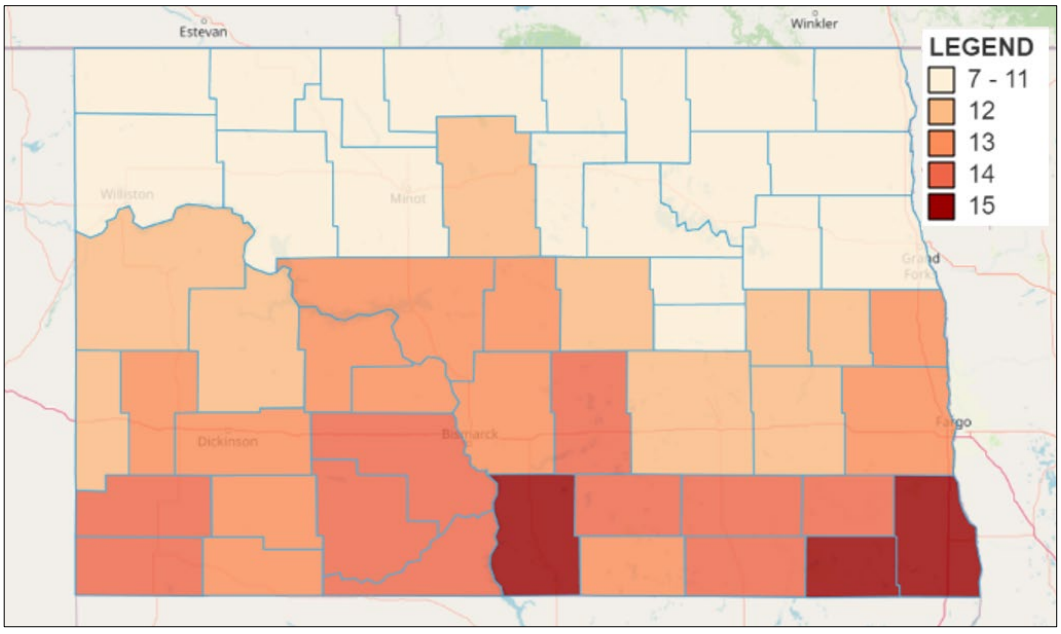
Hot weather is a problem for medications and the medicated. Coatings on medications can be damaged by the heat impacting the speed in which they are absorbed. Many medications make users more susceptible to sunburn and heat stroke (Roberts, 2022). These include common medications like ibuprofen, allergy medications, antibiotics, antidepressants, and blood-pressure drugs.

It is not just illness but age, social isolation and homelessness that can leave people vulnerable. Social factors about the neighborhood can impact people's survival in a heat event as well. Many of those who died in Chicago's 1995 heat wave were older people who felt socially isolated, had no one checking in on them and were either unwilling or unable to go to a cooling center (Klinenberg, 2003). Often those who ended up as fatalities were living in apartments where they lacked air conditioning and feared opening the window and exposing themselves to the perceived crime risk an open window invited in their neighborhood.

The North Dakota Department of Human Services and the North Dakota Department of Commerce in collaboration with the Community Action Partnership of North Dakota provides a Low Income Home Energy Assistance Program to purchase or repair air conditioners and/or other cooling devices for citizens. According to NDHHS (2023), in 2021, the cooling assistance program assisted 426 qualified households through this program.

At some level, every North Dakotan is becoming more vulnerable to heat. **Figure 4.6-45** shows the projected changes in the number of days exceeding 90 degrees Fahrenheit by 2045, given the best-case scenario with emissions. According to the Centers for Disease Control (CDC, 2020), even in the northern part of the state, there will be a week or more new days in the 90s, with some counties experiencing more than two weeks of days in the 90s.

Figure 4.6-45: Projected Changes in Excessive Heat Days, 2016-2045 (RCP4.5 Scenario)



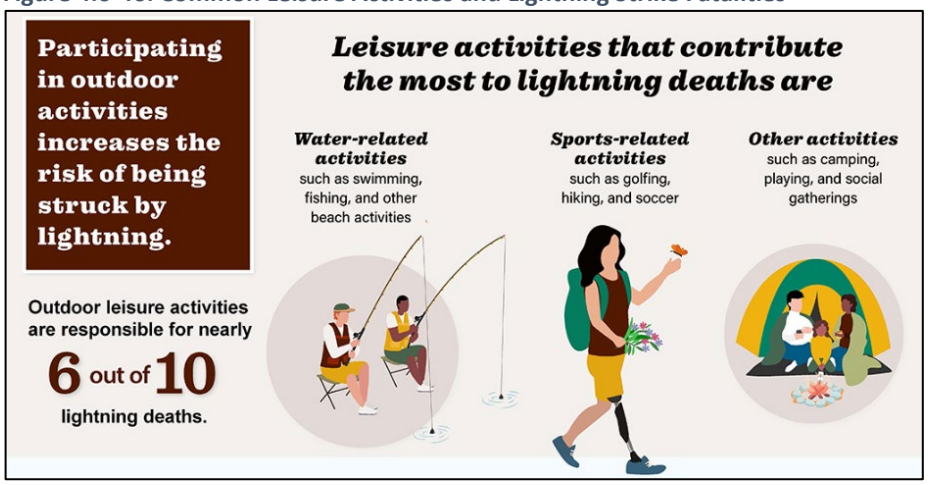
Source: Centers for Disease Control and Prevention, 2020

Lightning strikes hundreds of people in the U.S. each year, yet between 2006 and 2021, an average of only 28 people died each year, with most of the lightning deaths occurring in southern states, though one was recorded in North Dakota (CDC, 2022). According to the CDC (2022), though so few people are killed by lightning, the distribution of those who are killed is similar to that of the general public with and average age of 37, only one year younger than the median age of all citizens. However, males are 4 times more likely than females to be struck by lightning, which accounts for the lower average age.

In a 2018 ABC News interview (Biswas, 2018), Dr. Mary Ann Cooper, a noted author and medical authority on lightning injuries, and John Jensenius, a lightning safety specialist with the National Weather Service, discussed the science of lightning strikes and the medical issues involved in surviving them. As Dr. Cooper explains, “When lightning hits, it's like pointing a fire hose at a bucket. Only a small amount of water actually gets in, and the majority of water splashes out and around the bucket." But when that jolt hits the heart, in many cases the heart stops and people go into cardiac arrest. As Jensenius explains, the key to survival is to have CPR as quickly as possible after the lightning strike. Even though 10 percent or less of those who are struck by lightning die, those who survive are often left with debilitating injuries.

Figure 4.6-46 indicates the connection between summertime leisure activities and lightning strike injuries. Being outdoors during thunderstorms, for work or leisure, puts people in a vulnerable position. Especially for outdoor activities where people cannot quickly seek shelter, such as those in wide-open spaces, deep in the woods, or in high, exposed locations like roofs or communications towers. According to the CDC (2022), people involved in leisure activities accounted for nearly two-thirds of lightning-strike victims, while just under 20 percent were engaged in work. North Dakota’s most recent lightning fatality, in August of 2019, was loading mowing equipment into the back of their pickup truck, when struck.

Figure 4.6-46: Common Leisure Activities and Lightning Strike Fatalities

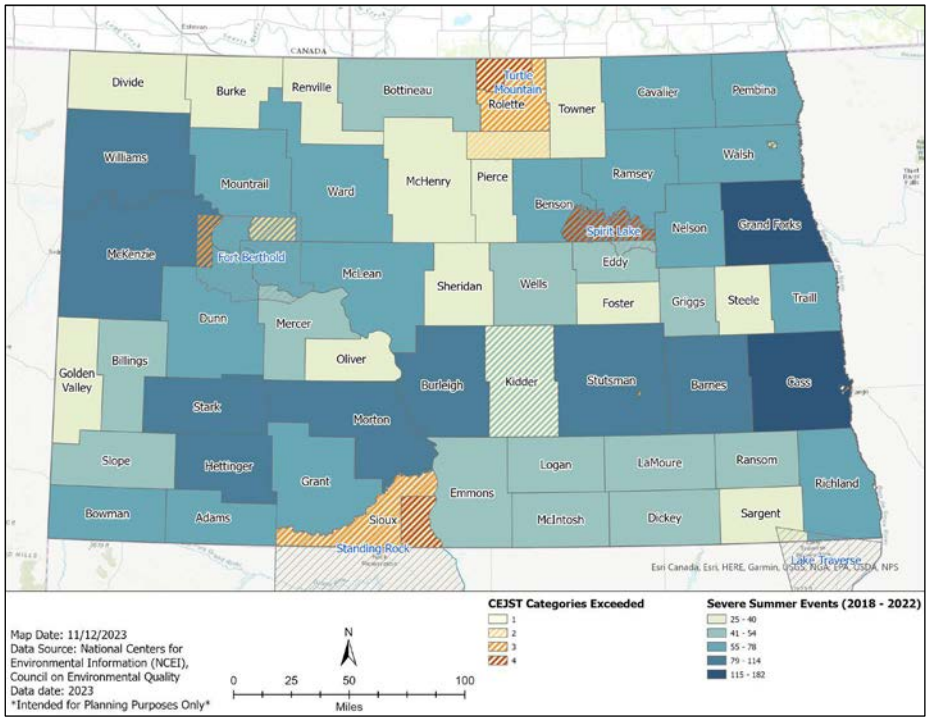


Source: Centers for Disease Control and Prevention, 2022

The primary risks from severe thunderstorms with large hail, damaging thunderstorm winds, and tornadoes come from impact injuries and car accidents due to the maneuvering or visibility challenges brought on by high winds and heavy precipitation. Most injuries in tornadoes and thunderstorms are from contaminated soft-tissue lacerations (54 percent), and fractures (30 percent), followed by blunt trauma (7 percent) and head injuries (7 percent) from impact or becoming airborne (Weir, 2000). Similarly, most deaths occur from head or spine injuries or from being crushed. Wind speeds of 40 miles per hour can begin to impact high-profile vehicles, such as semi-trucks, especially in wide-open areas. The wide sides of the truck can serve essentially as sails and cause the driver to lose control of the vehicle leading to swerving, accidents, or rollovers (Shrager, Sachs, and Blanco, 2021). Wind at 60 miles per hour can overturn a tractor-trailer.

Figure 4.6-47 shows the number of severe summer hazard events between 2018 and 2022 (NCEI, 2023) along with the Census tracts that have CEJST exceedance categories (US Council on Environmental Quality, 2023). These areas represent jurisdictions where social vulnerability and environmental burdens are high, and local resources may be too limited to support recovery from events.

Figure 4.6-47: Severe Summer Weather Events and CEJST Exceedance, 2018-2022



Source: CEQ, 2023; NCEI, 2023

Obstacles in areas like Bismarck, Fargo, Grand Forks, and Williston can include language barriers where higher numbers of immigrants may be inexperienced with extreme regional weather terminology or conditions.

Increased instances of poverty in certain areas may limit resources available for air conditioning or for recovery from storm damage. In larger urban areas like Fargo or in more rural neighborhoods with violence and robbery concerns, it may be unsafe for people to open doors or windows during excessive heat events. Periodic smoke plume intrusions or local air pollution in areas of Fort Berthold may make residents less willing to open windows due to health concerns. Air pollution exposure can cause breathing struggles that worsen in hot weather.

Local and Tribal Multi-Hazard Mitigation Plans (MHMPs) have identified areas where the vulnerabilities to severe summer weather are highest. The community of Sanborn in Barnes County (2021) has a large number of elderly and a large number of mobile homes, which could lead to a struggle for the community should damaging winds hit. Increased wind gusts funneling through the Missouri River Valley at the Four Bears Bridge, in the Fort Berthold/MHA Nation (2018), create concerns for traffic that may be passing high-profile trucks and trailers. Throughout this area of the Missouri River Breaks and Lake Sakakawea there are a large number of recreational campgrounds that lack either sirens or storm shelters, placing campers at an increased risk for severe weather impacts. The 10 July 2018 Tornado in Watford City illustrated the vulnerability of oil workers in western North Dakota. The McKenzie County MHMP (2020) calls for shelter projects based on the number of residents living in temporary housing units who may not have access to adequate shelter or emergency notification during a severe summer storm event.

Nearly every local plan in the state was able to identify communities where vulnerability to severe summer weather was high due to the need for local sirens, or the need to upgrade sirens so they could be remotely activated. Communities which specifically identified a need to upgrade warning systems include Kensal in Stutsman County (2021), Almont in Morton County (2022), and Balta in Pierce County

(2019). Some of these communities had additional concerns. Balta, for example, in addition to the lack of sirens has a large summer festival but no suitable shelter should severe weather threaten. Both Sarles and Wales in Cavalier County (2022) lack sirens and shelters, and they are more than 30 minutes from the nearest first responder. Spiritwood Lake in Stutsman County (2021) lacks sirens and shelters and quadruples in size during the summer, with most of the temporary residents staying in mobile homes, RVs, or cabins that lack adequate protection from damaging winds. There are numerous other small, Lake side, recreational communities, that face these same vulnerabilities of isolation, lack of warning sirens, and inadequate storm shelters.

4.6.2.2 First Responders

Each of the severe summer hazards may require responses from first responders. Many responders are also trained as SkyWarn Storm Spotters and may be activated, through their departments, in advance of developing severe storms. Damaging thunderstorm winds, large hail, and even tornadoes that occur over open country may not elicit an emergency response. These same damaging winds, large hail, or tornadoes that may track through farmsteads or rural housing areas could require a coordinated response from multiple first responders to include police, fire, emergency medical services, search and rescue and emergency management. Extreme thunderstorm wind damage and/or strong tornadoes impacting a community may necessitate a more protracted response and either Tactical or Emergency Operations Center activation.

First responders' duties often involve being out in the heat and in the case of firefighters, sometimes in the fire, during excessive heat, and while wearing heavy protective clothing. The leading cause of on-duty deaths to firefighters is cardiac arrest, which is often brought on by heat exposure – fire, ambient weather or in combination (George, 2022). While dealing with heat is part of a firefighter's routine, and they know what precautions to take, including staying hydrated and taking breaks, excessive heat can make the need for water and breaks greater than typical.

Figure 4.6-48: Fargo Police Officers working outside.

Source: Michael Vosburg/Fargo Forum, 2019

One precaution that fire departments can take to protect their responders from suffering from heat is to reduce, alter or suspend training exercises when there is excessive heat (Denehy, 2008). According to Williams et al. (2020), in addition to the increased physiological stress experienced by firefighters in heavy clothing and police officers in heavy body armor, the relative risk of both fire and police calls tends to increase on extreme heat days when compared with nonextreme heat days, including in cities like Fargo.

4.6.2.3 Environmental, Natural, and Cultural Resources

Many of the impacts that excessive heat has on the environment overlap with the consequences drought, discussed in Section 4.1, has on the environment.

North Dakota's tree covered landscape is made up of native forests, conservation plantings and community forests producing a myriad of environmental and economic benefits to its residents. Historically, only about 700,000 acres of the state (about 1.5 percent) was considered forested, and today, forestland covers about 450,000 acres (approximately 1 percent of the state) (DNG&F, 2023). The definition of forest, according to the USDA Forest Service (2022) requires, "an area of trees at least one acre in size with a minimum dimension of 120 feet by 363 feet and 10 percent live canopy cover" based on the North Dakota Forest Health Highlights.

Diplodia pinea (Sphaeropsis sapinea), is a fungal disease that causes pine shoot blight and cankers on stems that can be found on all size classes of pines in all growing circumstances and is a biotic tree health issue for North Dakota's forests based on the North Dakota Forest Health Highlights as compiled by the North Dakota Forest Service (Gag, 2022). Diplodia can be found at persistent, but low, levels in many pine plantings across the state. With extremes in drought and precipitation this disease will always be present in the North Dakota landscape. By maintaining its presence, storm events can cause damage to tree crowns, allowing for circumstances that exacerbate infections. Based on the 2022 report (Gag, 2022), small wounds from hail and wind damage create ideal circumstances for spores to enter the conductive tissues, causing a canker to form, cutting off any conductance to the distal end of a branch.

According to the North Dakota Forest Service, the state has very few natural pine stands, and on July 5, 2022, a hail incident helped paint a swath of diplodia through approximately 1,200 acres (about twice the area of Central Park in New York City) of ponderosa pines in Slope County. Most damage sustained was to the outer, small branches on the windward side from which the storm approached. This level of hail damage will take a few growing seasons to repair and will only cause subtle mortality to already severely, weakened trees.

Figure 4.6-49: Slope County Ponderosa Pine with Diplodia Shoot Blight After Hail, 2022

Source: NDSU State Forest Service Forest Health Highlights, 2022

Tornadoes, severe thunderstorms, high winds, and lightning can have a profound impact on forest and tree resources as well. These events can ground standing timber, break branches, weaken trees and leave debris that continue to impact natural resources by serving as fire fuel (Crosby, 2020). Winds can twist trunks and break limbs, leaving trees vulnerable to pests. According to the American Forest Foundation (2023), trees can be uprooted and debarked, leaving them vulnerable.

4.6.2.4 Property, Facilities, and Infrastructure Damage

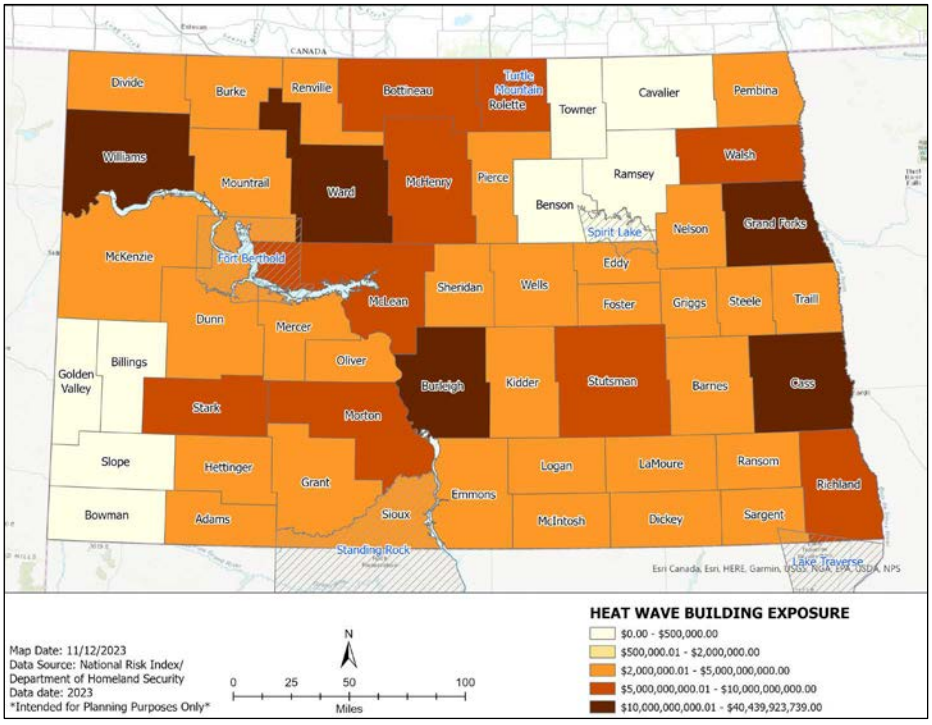
Vulnerability to some severe summer hazards is related to property or facility types. Residential construction has improved as advancements in building codes and science, material quality and technology have progressed over the years. Mobile and manufactured homes, by nature of their construction and material quality, are the most vulnerable or least resistant to all severe summer hazards according to FEMA building code guidance.

> Building codes ensure buildings and structures are built adequately to better withstand severe summer weather. The cities of Goodrich, Martin and McClusky have adopted building codes, but lack enforcement.
>
> *(Sargent County Multi-Jurisdictional Hazard Mitigation Plan, 2022)*

4.6.2.4.1 Heat Wave/Excessive Heat

Figure 4.6-50 shows building exposure by county for heat waves, based on National Risk Index analyses (NRI, 2023). Excessive heat can damage property, and fourteen counties have more than $5 billion in building exposure. Heat and humidity combined with poor circulation can weaken walls, deteriorate shingles, and promote mold development (Armstrong, 2021). Sun-baked caulk can decay and permit leaks. According to Armstrong (2021), wood floors and furniture expand and contract with heat and humidity, leading to the loosening of joints and buckling.

Figure 4.6-50: National Risk Index Building Exposure to Excessive Heat Damage



Source: NRI, 2023

Infrastructure also faces threats from excessive heat. Higher temperatures make it more difficult to meet effluent discharge water standards (EPA, 2023). Heat and evaporation increase the biologic and saline content of water to be treated for municipal or irrigation purposes.

The electrical grid faces the dual threat of high-demand and stress from the heat. During excessive heat events, the electrical demand peaks as more power is needed to cool buildings (Neuman, 2022). Heat can lead to sagging in electrical wires, which can bring them into contact with trees or other items (Heilweil, 2021). Both power plants and electrical transmission lines lose efficiency in high heat.

4.6.2.4.2 Large Hail

Hail, with its high-speed projectiles, is a much easier understood risk to property than excessive heat. In 2019, damaging wind and large hail comprised 34.3 percent of property damage claims in the nation (McGinley, 2023), with an estimated 6.2 million American properties impacted by hail in 2020. Roofs are the most common victim of hailstones, and the largest of hailstones that fall in North Dakota have the potential to punch through a roof, leading to potential damage to building interiors (Erdman, 2019). Siding, doors, and windows are also at risk, especially older windows, storm doors and manufactured homes (Erdman, 2019). Note the shattered siding on manufactured housing in Killdeer, shown in **Figure 4.6-51.** According to Cheng (2023), photovoltaic systems are also easily damaged by hail and are often not covered on traditional insurance policies covering the equipment in the home.

Figure 4.6-51: Hail damage in Killdeer, 10 July 2016.

Source: Ohio Storm Chasers via YouTube, 2016

Vehicles also face the wrath of hail. Golf-ball-sized hailstones can dent vehicles and crack windshields, while baseball-sized hailstones can smash through the windshields (Erdman, 2019). On June 9, 2001, hail that fell during severe thunderstorms in Bismarck and Mandan caused significant damage to homes and vehicles. According to the NWS (2023), the estimated damage from the hail to both these cities was around $260 million, or close to $460 million in 2024 dollars.

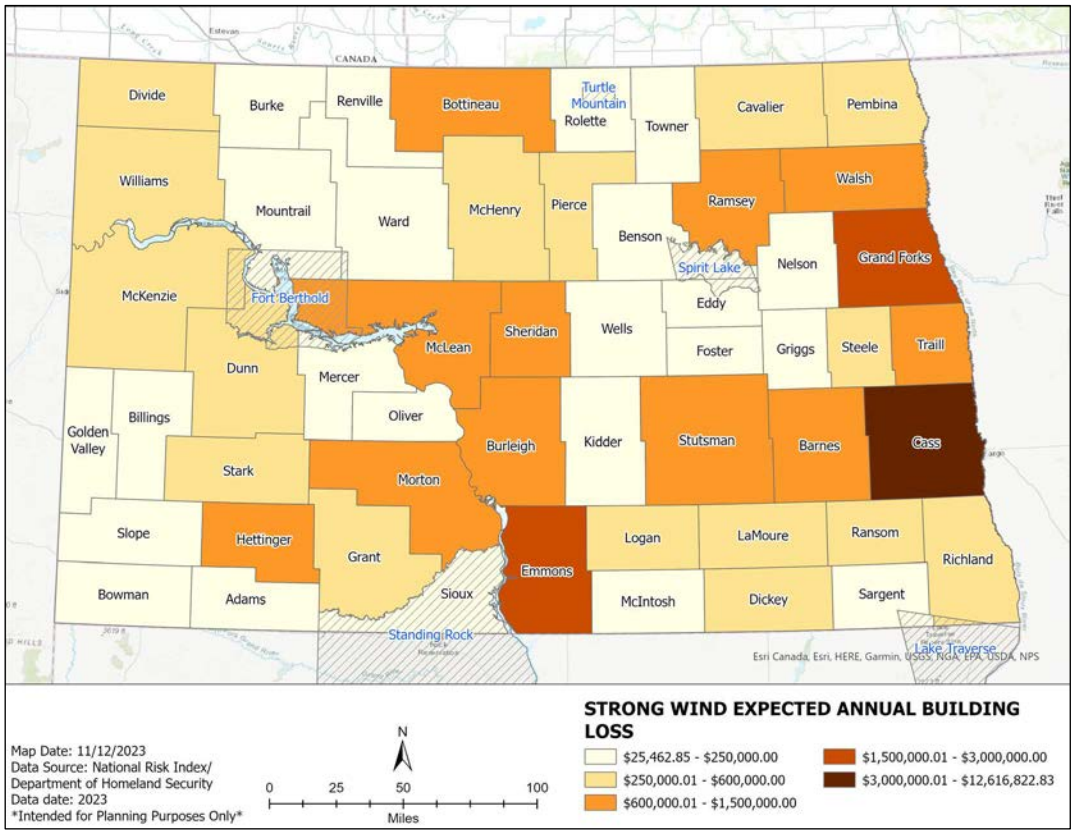
Building residential and commercial property and facilities to the highest standards following the most current building codes utilizing more durable materials can result in greater resilience to severe summer hazards. For example, roofing shingles are available in ratings up to Class 4, meaning the shingle must withstand "the steel ball test" or "must withstand having a 2-inch steel ball dropped multiple times from a height of 20 feet. For more perspective, if this same test is repeated on a 4-inch concrete paver, the force of the steel ball would crack the paver in half" (Underwriters Laboratory (UL), 2218, 2020). According to UL (2020), Class 4 shingles are considered one of the most hail resistant building materials currently available on the market as of 2023.

4.6.2.4.3 Strong/Damaging Wind

Figure 4.6-52 shows the NRI Expected Annual Building Loss in the state from strong winds (NRI, 2023). Based on the average frequency of storms for the 1986 through 2019 period, Emmons County joins the urban areas of Grand Forks and Cass in those areas that would be expected to lose more than $1.5 million a year.

> A strong storm developed a microburst, causing 130 mph winds and very large hail. The worst damage was northwest of Stanton with property damage at approximately $400,000, along with $75,000 in crop damage. Additional property damage elsewhere in [Mercer County totaled $485,000.
>
> *(Mercer County Multi-Jurisdictional Hazard Mitigation Plan, 2022)*

Figure 4.6-52: NRI Expected Annual Building Loss from Strong/Damaging Winds,



Source: NRI, 2023

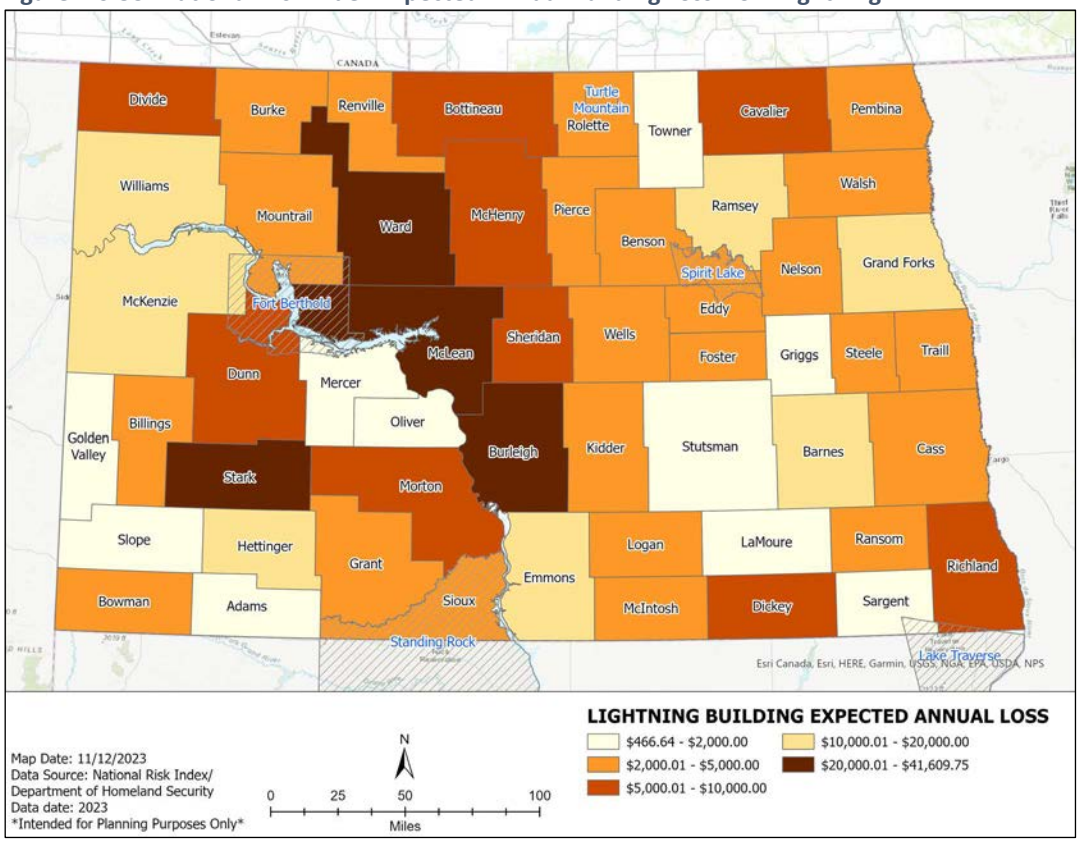
4.6.2.4.4 Lightning

There are four main categories of property damage produced by lightning (Coghlan, 2021): 1) Lightning can be a direct cause of physical damage to structures through the ignition of fire or cracking of concrete or brick. 2) An electrical arc can cause indirect damage by creating a fire from flammable materials. 3) Electromagnetic Pulse Damage can occur from a power surge. 4) A ground reference surge can damage electrical equipment in a building.

Figure 4.6-53 looks at the expected building loss by county, based on National Risk Index analyses (NRI, 2023). The Missouri River Valley has elevated loss figures as compared to the rest of the state.

When lightning strikes an electrical structure, it sends the power of its current into the system (Mari, 2020). At risk are electrical towers since lightning typically strikes taller metal structures, which can cause flashovers that harm the system. Mostly, other structures can absorb and redistribute this current (Mari, 2020).

Figure 4.6-53: National Risk Index Expected Annual Building Loss from Lightning



Source: NRI, 2023

4.6.2.4.5 Tornadoes

Safe rooms are one solution to providing shelter from tornadoes in open areas. FEMA defines a Safe room as a storm shelter specifically designed to provide "near-absolute" protection in extreme wind events (FEMA, 2023). There are four different types of safe rooms:

- **Residential Safe Room:** A safe room serving occupants of dwelling units and having a design occupant capacity not exceeding 16 persons.
- **Community Safe Room:** Any safe room not defined as a residential safe room. This includes safe rooms intended for use by the general public, by building occupants or a combination of both.
- **Stand-alone Safe Room:** A separate building (i.e., not within or attached to any other building) that is designed, constructed (or retrofitted), and sited in accordance with FEMA P-361 to provide near-absolute protection from tornadoes and/or hurricanes.
- **Internal Safe Room:** A FEMA P-361-compliant room or area enclosed by or attached to a larger building (host building). An internal safe room (room or area) should be designed and constructed (or retrofitted) to be structurally independent of the host building, providing the same wind and wind-borne debris protection as a stand-alone safe room. The design of the safe room should assume the failure of the host building.

FEMA publishes standards for safe rooms: FEMA P-361, Safe Rooms for Tornadoes and Hurricanes: Guidance for Community and Residential Safe Rooms (2021) and FEMA P-320, Taking Shelter from the Storm: Building or Installing a Safe Room for Your Home (2021). According to FEMA, properties and facilities that have some form of safe room, while not protecting the actual structure, are inherently providing the best-known level of protection for the individuals, families, employees, or patrons that may be on-site during a severe summer hazard incident.

4.6.2.5 Critical Facilities, Community Lifelines, and State Assets

Many critical facilities face the same risks from summer hazards as private property. Excessive heat, large hail, and damaging winds can impact facilities in many of the same ways.

Severe summer hazards can impact multiple Community Lifelines:

- **Safety and Security:** Severe hail, wind and tornado events that are larger in scope and complexity will require a coordinated response from multiple first responders, including law enforcement, fire departments, search and rescue, public safety personnel such as emergency management staff and public utilities staff.
- **Food, Hydration, and Shelter:** Excessive heat and large hail are both hazards that can destroy crops, disrupting local economic revenue and causing wider supply chain issues.
- **Health and Medical:** Excessive heat can be a public health crisis, especially for vulnerable populations and the labor force that works in full time employment that exposes them routinely to the elements.
- **Transportation:** Damaging winds, frequent lightning, tornadoes, and large hail will ground air travel, either delay or cancel flights, and limit vehicular travel.

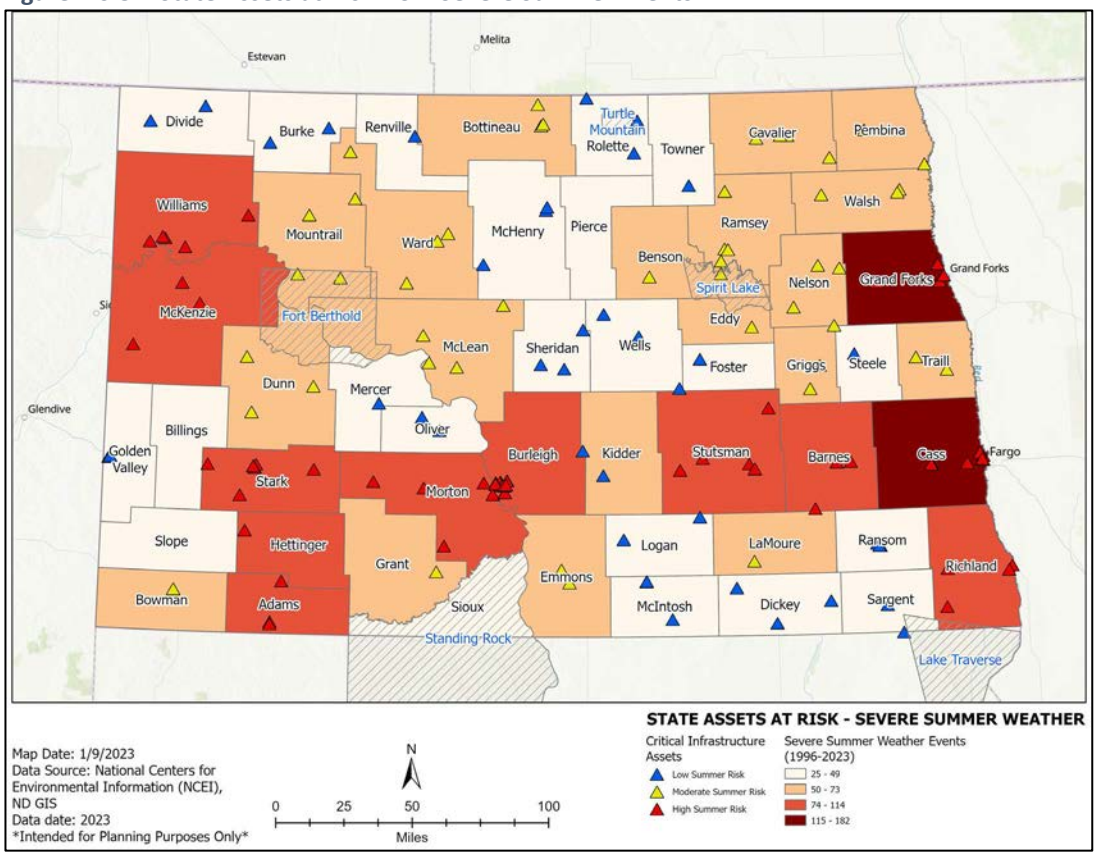
By their designation, critical facilities need to remain functional despite any hazard and the essential staff such as those in health care related facilities, where more vulnerable populations reside, need to be protected while sheltering-in-place.

Large hail, lightning, damaging winds, and tornadoes pose a great threat to state assets, assuming the assets are in direct impact or contact with the hazard. For example, state fleets that are not parked inside parking garages or otherwise covered could be damaged if exposed to a severe hailstorm, and any state-owned facility could sustain damage should it be in the pathway of a tornado. The risk for state assets is situational to the summer hazard, its severity, and its location.

While Oil and Gas Safety employees care about the industry's well-being, they are also residents of our communities. While conducting outreach in Dickinson, participants recalled the 2018 Severe Summer Weather and tornado in Watford City. The EF2 Tornado hit a large RV park comprised of traditional mobile homes and campers (Dura, 2018). Two hundred and twenty-five homes were damaged leaving 200 people displaced. One infant was killed and two dozen people were injured, with nine sustaining critical injuries.

The tornado impacting a camp resulted in far more impacts than if traditional homes were the main target. Individuals living in mobile homes or in temporary housing situations are usually more vulnerable to severe summer storms, including damaging wind events. Rapid population growth, with new residents still unfamiliar with the area added additional complexity for First Responders, especially when considering that the storm impacted an already underserved community.

Figure 4.6-54: State Assets at Risk from Severe Summer Events



Source: NCEI, NDGIS, 2023

Figure 4.6-54 shows the juxtaposition of state assets, as mapped by the state, and their exposure to risk from severe summer weather events. The darkest two colors on the map represent areas of high risk, in which 74 or more events occurred between 1996 and 2023, according to the NCEI (2023). Within those counties with a high number of events are 341 total state assets. In the high-risk counties of Grand Forks and Cass there are 110 state assets. The breakdown by category is 26 agricultural, 1 finance, 2 chemical, 12 communications, 1 emergency service, and 57 government assets. These include UND and NDSU campus buildings (NDGIS, 2023). The total insured value of state assets in the high-risk category is $385,711,424 (NDSFTF, 2023). In the moderate-risk categories were 231 state assets, totaling $149,780,099 (NDSFTF, 2023). According to the NDGIS (2023), these include 195 government, 19 agricultural, 1 chemical, and 14 communications assets.

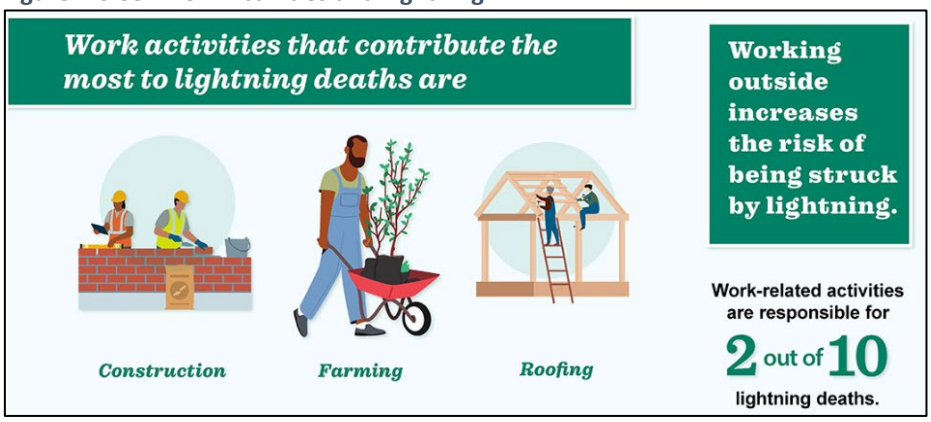
4.6.2.6 State Economy and Economic Disruption

Many of North Dakota's largest economic sectors face the consequences of severe summer weather. Agriculture, oil and gas, and tourism all risk loss from severe summer weather, some of which are specific to their industry.

Across all industries outdoor workers face the risk of dehydration and other human health impacts from excessive heat, and risk from harm from wind-blown debris and hailstones from storms. According to

the CDC (2022), lightning is also a threat for outdoor workers with nearly 2 in 10 lightning strike deaths occurring while the victim was working.

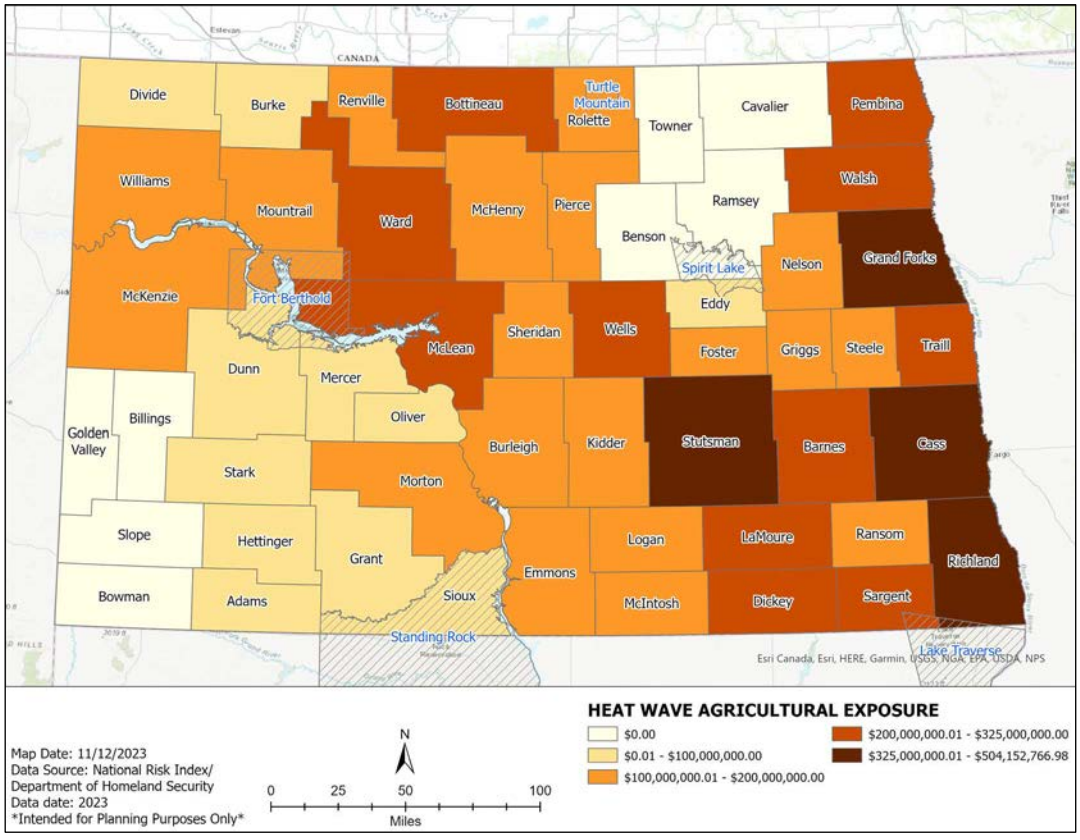
Figure 4.6-55: Work Activities and Lightning



Source: Centers for Disease Control and Prevention, 2022

As much as people face health risks from excessive heat and lightning, animals and plants face the same risks of dehydration and death from exposure. Animals and plants also can face the same risks of injury or death from impacts from hail or wind-blown debris. **Figure 4.6-56** uses FEMA NRI (2023) data to evaluate agricultural exposure to a heat wave or other severe summer hazard.

Figure 4.6-56: National Risk Index Agricultural Exposure to Heat



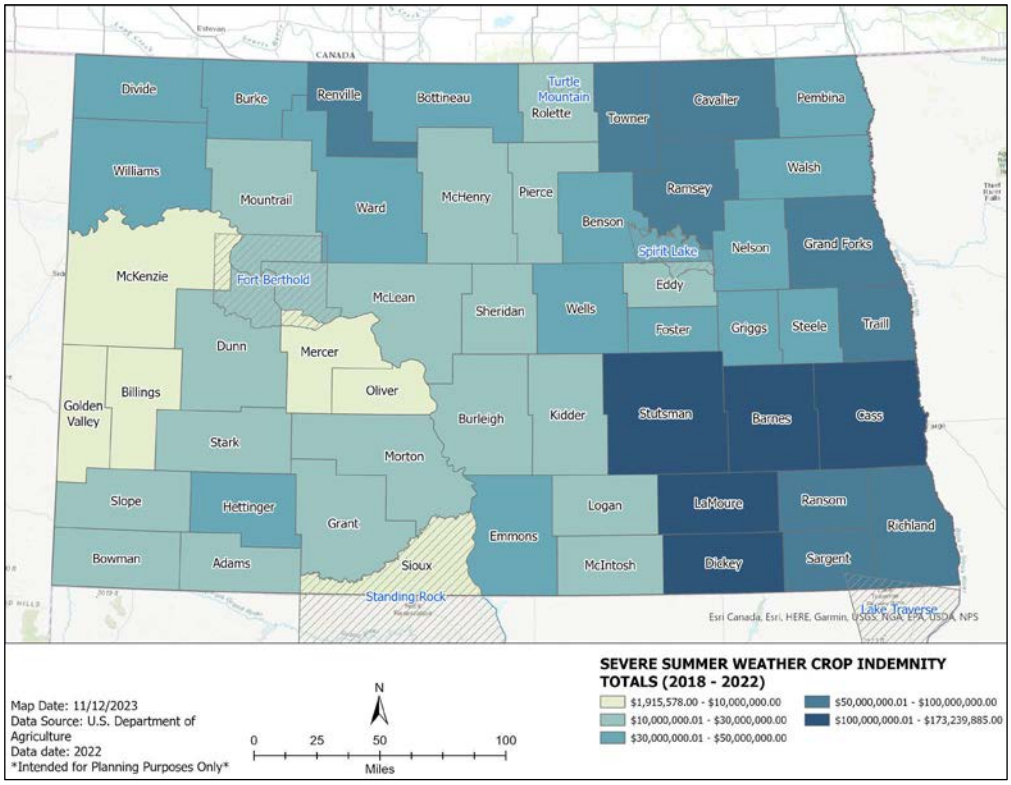
Source: NRI, 2023

The total U.S. crop indemnity amounts paid out by the USDA Risk Management Agency for severe summer weather between 2018 and 2022 was $8,075,855,508, topping all other hazards for crop-insurance payments (USDA Risk Management Authority [RMA], 2023). Hail can be brutal to crops, and it

is not unusual for hail to turn a field into a total loss. According to Erdman (2019), secondary hail policies are typical for farmers in hail-prone areas.

Figure 4.6-57 shows crop Indemnity payments for damaging wind-related hazards and other severe summer weather (USDA RMA, 2023). Among commodities, corn was the hardest hit in the state, with more than $200 million in annualized losses from 2018-2022. Soybeans and wheat also had more than $90 million a year in losses during that period.

Figure 4.6-57: Crop Indemnity Totals for Severe Summer Weather, 2018-2022



Source: USDA, 2023

Figure 4.6-58 shows a fire at a saltwater disposal site near Alexander ND, on July 7th, 2014, that was started by a lightning strike. Lightning is a problem for oil tanks and oilpatches. Lightning can cause equipment damage, explosions, spills, and shutdowns (Martin, 2021). Often the tallest structures in the vicinity, oil and gas facilities can serve essentially as a lightning rod, and their flammable substances and vapors make lightning strikes more dangerous than most structures. According to Martin (2021), the fiberglass structure of storage tanks can create electrical resistance that creates more heat and increases the likelihood of fire or explosions.

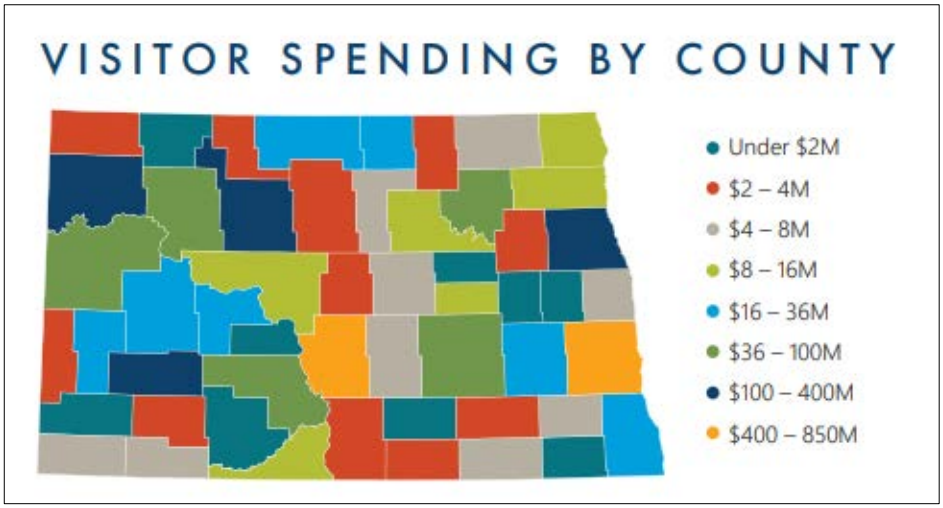
Figure 4.6-58: Saltwater Disposal Site Fire near Alexander

Source: Jappe, 2014. Reprinted with permission.

Tourism is North Dakota's third largest industry (North Dakota Tourism Division, 2022). Nearly 22 million visitors came to North Dakota in 2021 to experience all there is to see and do. The Department of Tourism has no shortage of suggestions to offer: 13 state parks, the Badlands and Theodore Roosevelt National Park; 16 National Recreational Trails, museums, more golf courses per capita than any other state in the nation, dozens of mountain bike trailheads; lakes and rivers to fish, canoe, swim, kayak, paddleboard, boat and jet ski; campsites for all comfort levels, from pitching the classic tent to RV spots to full accommodation cabins; biking, birdwatching, horseback riding and trail running.

Open fields, rolling hills and healthy wetlands make North Dakota a premier hunting destination (ND Tourism, 2022). Within the state locals and visitors can get a license to hunt bighorn sheep, deer, elk, moose, pronghorn, tundra swan, wild turkey, pheasant, sharp-tailed grouse, upland game, waterfowl, furbearers, waterfowl, ground squirrel, prairie dog, porcupine, and rabbit.

Figure 4.6-59: Tourism Spending, 2021



Source: North Dakota Department of Commerce, 2023

Recreation is supported by the lodging, retail, air passenger transport and food and beverage industries. According to the North Dakota Tourism Division (2023), collectively, the tourism industry creates jobs, employing nearly 43,000 workers in 2,500 businesses and generates sales in every county of the state with visitors spending roughly $3 billion dollars statewide each year.

> The former grain elevator in Epping loses pieces of its metal sheathing during strong wind events. The sheathing sometimes blows through the city at a rapid speed and is a risk to people and property.
>
> *(Williams County Multi-Jurisdictional Hazard Mitigation Plan, 2017)*

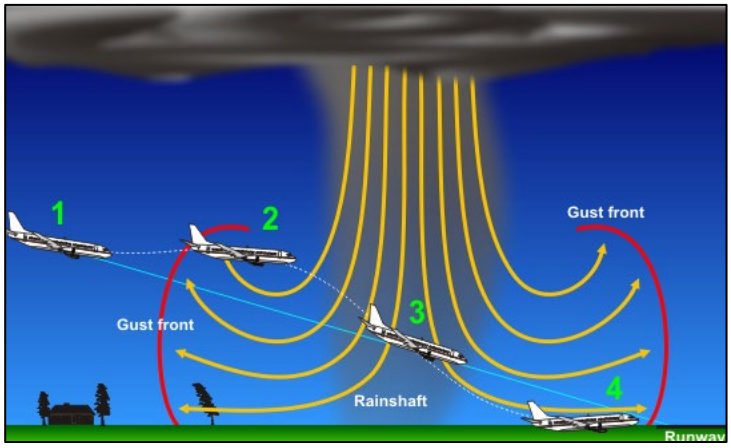
The tourism industry relies heavily on locals and visitors alike being able to enjoy all the state has to offer in comfortable, but more importantly, safe conditions. Lightning, hail, damaging winds, and tornadoes can cancel profitable, large-scale events, such as rodeos or outdoor concerts (O'Neill, 2022; Kautzman, 2020). High wind and excessive heat, especially when the increased temperatures linger for consecutive days or weeks, reduce the number of people engaging in outdoor activities (Leal-Filho et. al, 2021), this can result in lost revenue in the form of less gear rentals, less reserved tee times, less daily park passes sold and canceled guided tours, to name a few examples.

Severe summer weather can negatively impact tourism, commerce, and recreational activities. It can also impact transportation into and through summer storm impacted areas. This hazard section has already highlighted several impacts that severe summer weather can have on transportation corridors, such as excessive heat buckling road and rail beds, large hail smashing vehicle windshields, and

damaging winds blowing high profile vehicles off the road. The Transportation Incident section of this plan goes into a more detailed discussion of these impacts.

Figure 4.6-60. Thunderstorm downburst winds can be fatal to pilots and their passengers, especially while aircraft are attempting to land in strong to severe thunderstorms (Shepherd, 2018). Prior to advances in Doppler radar in meteorology, undetected wind shear from these events would often drive planes toward the ground and cause crashes, including the 1985 Delta 191 crash that killed 137 people.

Figure 4.6-60: Downburst Impacts on Airplanes



Source: NWS-ZME, 2023

According to Cox (2016), most commercial craft in use today have Doppler radar in their aircraft, while Terminal Doppler Weather Radars (TDWRs) have been installed at most major airports. Even with these detection methods in place, downbursts still pose an extreme danger for large and small aircraft alike.

4.6.2.7 Delivery of Service and Continuity of Operations

Of the severe summer hazards, a tornado incident is the one likely to pose the greatest risk to the maintenance of continuity of state operations and ongoing delivery of services, assuming the tornado directly impacts a sizably populated community. This potential scenario would require a coordinated, multi-agency response from local and state agencies, and depending on the severity and complexity of the situation, may require federal support (FEMA NIMS, 2017). The North Dakota Department of Emergency Services (NDDES) is the lead agency in maintaining the NDDES Continuity of Operations Plan, for how to continue essential functions of state service in times of natural disaster.

4.6.2.8 Public Confidence in the State's Governance

A recent study on severe weather preparedness in the United States indicated that 90 percent of respondents are just as concerned or more concerned about severe weather than they were two years ago, and 86 percent have at least a fair level of confidence that their government is prepared for such an event (Havich, 2022). The same study indicated that just 27 percent of the respondents felt very prepared themselves, indicating that while the public had confidence in government there is still an opportunity for the government to help improve preparation at the household level. According to Havich (2022), improving communications between

From the Survey: "I remember after the tornado came through town, my parents picked us up and we drove past our home in town. Our roof was destroyed, trees were blown over, windows were destroyed, debris was everywhere, the basement flooded, and the siding was damaged. I remember my parents were afraid they couldn't afford to pay for damages and were very stressed. Thankfully, the Salvation Army walked around and handed out water, food, and cleaning supplies as the town tried to clean and fix their homes."

the government and individuals was seen as the most popular method at 46 percent to translate preparedness.

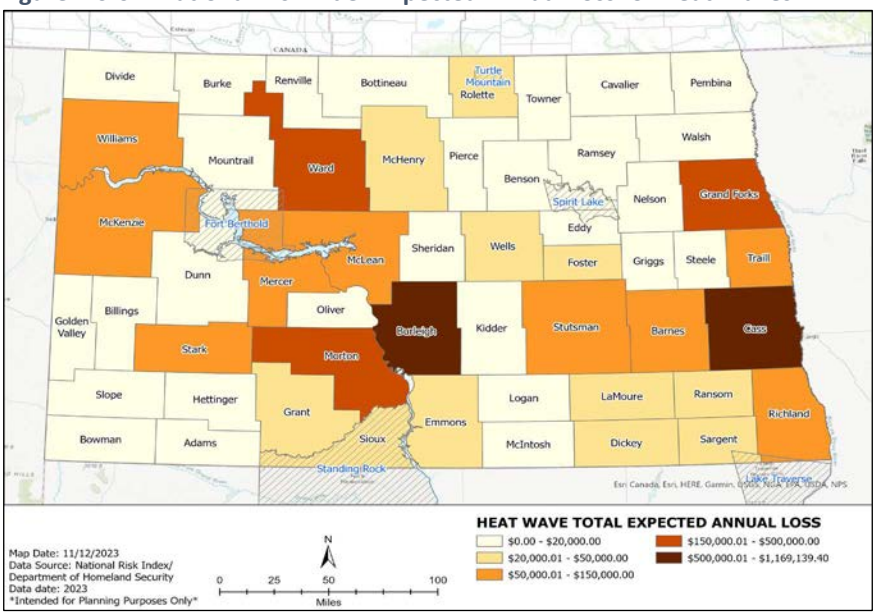
4.6.2.9 Estimation of Annual Losses

NCEI data reported no fatalities, injuries, or damages from excessive heat events since 2018 (NCEI, 2023), but FEMA NRI data calculated an expected annual loss from heat waves for its dataset, which is shown in **Figure 4.6-61** (NRI, 2023). The loss of data highly corelates with population.

Figure 4.6-62 shows the NRI data for large hail (NRI, 2023). The data shows increased losses along the I-94 corridor and along the Red River Valley, where higher vehicular traffic may be more exposed to hail damage.

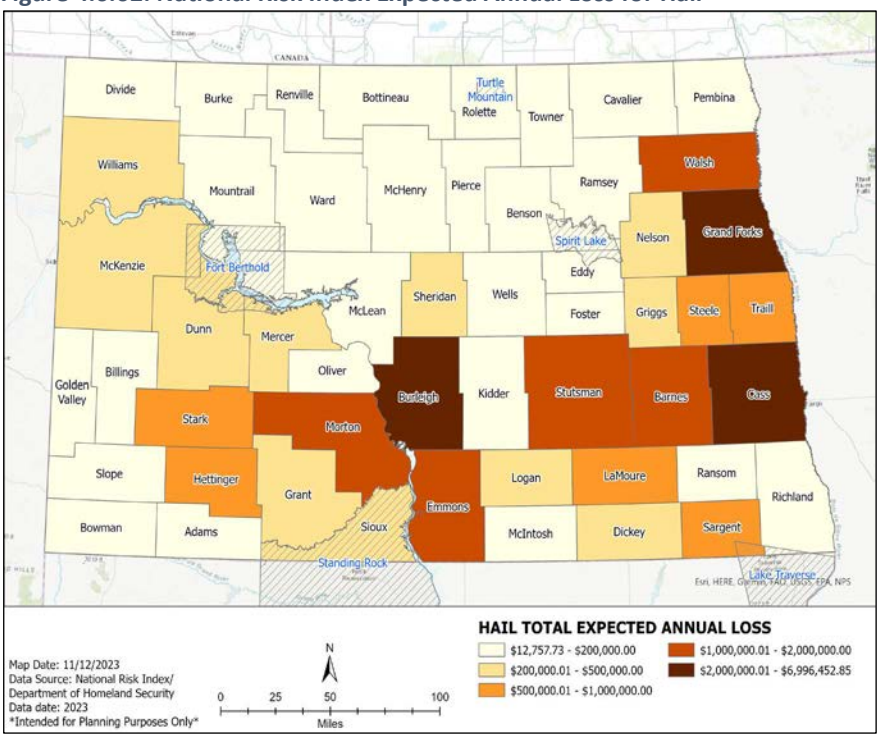
Figure 4.6-63 displays the consequences of large hail events in the state since the NCEI database began collecting data on large hail in 1955 (NCEI, 2023). Most reported property damage has come from hailstones 2 diameter or larger, while most crop damage comes from the more frequent occurrence of smaller stones between 1 and 2 inches in diameter, all of which are quite common across the state.

Figure 4.6-61: National Risk Index Expected Annual Loss for Heat Waves



Source: NRI, 2023

Figure 4.6.62: National Risk Index Expected Annual Loss for Hail



Source: NRI, 2023

Figure 4.6-63: North Dakota Hail Impact by Stone Size, 1955-2022

Stone Size	Events	Injuries	Property Damage	Crop Damage
Less than 1 Inch	2,219	-	$ 1,274,000	$ 9,385,000
Between 1 and 2 inches	5,440	11	$ 175,694,600	$ 112,104,003
Between 2 and 3 inches	703	8	$ 258,758,000	$ 38,775,000
Between 3 and 4 inches	62	6	$ 107,777,000	$ 4,085,000
4 inches or Greater	49	7	$ 17,105,000	$ 6,950,000
Total	**8,473**	**32**	**$ 560,608,600**	**$ 171,299,003**

Source: NCEI, 2023

Figure 4.6-64 shows the change in annualized losses in the plan update period, 2018-2022, as compared to the full NCEI hail data history, dating back to 1955 (NCEI, 2023). Both property damage and crop damage are more than three times lower between 2018 and 2022 than since 1955 (NCEI, 2023).

Figure 4.6-64: North Dakota Annualized Hail Damages, 2018-2022

1955-2022		2018-2022	
Property	**Crops**	**Property**	**Crops**
$8,367,293	$2,556,702	$1,994,400	$941,800

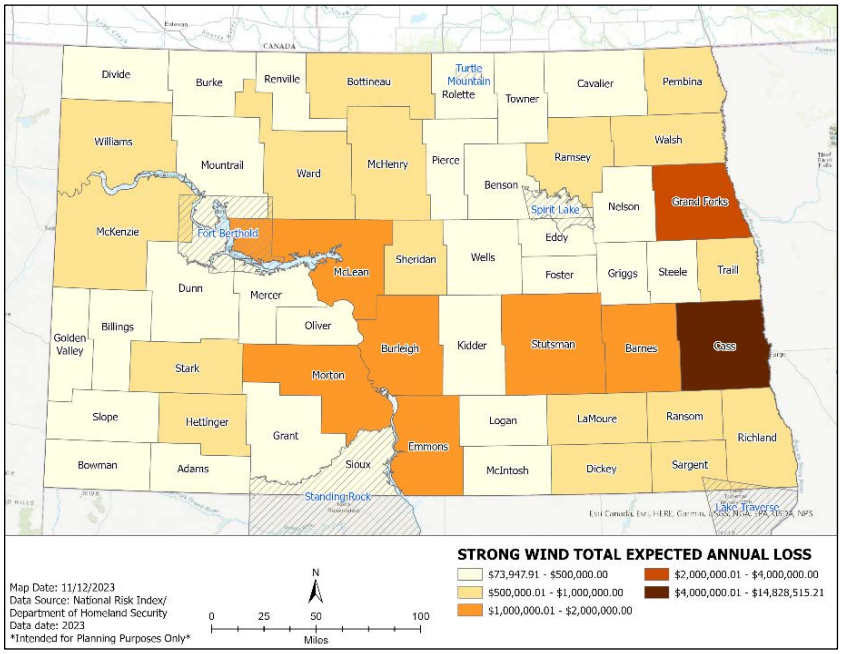
Source: NCEI, 2023

Figure 4.6-65 indicates the expected annualized loss for damaging thunderstorm winds, based on NRI data analysis (NRI, 2023).

The NCEI database has been monitoring Damaging Thunderstorm Wind events since 1955 and is the source for data in **Figures 4.6-66 and 4.6-67** (NCEI, 2023).

Figure 4.6-66 breaks down consequences by the type of wind event. According to NCEI (2023), thunderstorm wind is the most consequential with twice as many deaths and injuries and 20 times as many damages.

Figure 4.6-65: NRI Expected Annual Loss for Damaging Thunderstorm Winds



Source: NRI, 2023

Figure 4.6.66: Consequences of Damaging Thunderstorm Wind Events in ND by Damage Type, 1955-2022

Wind Type	Events	Deaths	Injuries	Property Damage	Crop Damage
Thunderstorm Wind	6,088	4	68	$ 290,093,200	$ 203,608,000

Source: NCEI, 2023

Figure 4.6-67 looks at the annualized data across the NCEI dataset and for the plan update period of 2018-2022 (NCEI, 2023). According to NCEI (2023), recent years have shown a dramatic increase in all consequences, including more than 10 times the total amount of damages for crops and property.

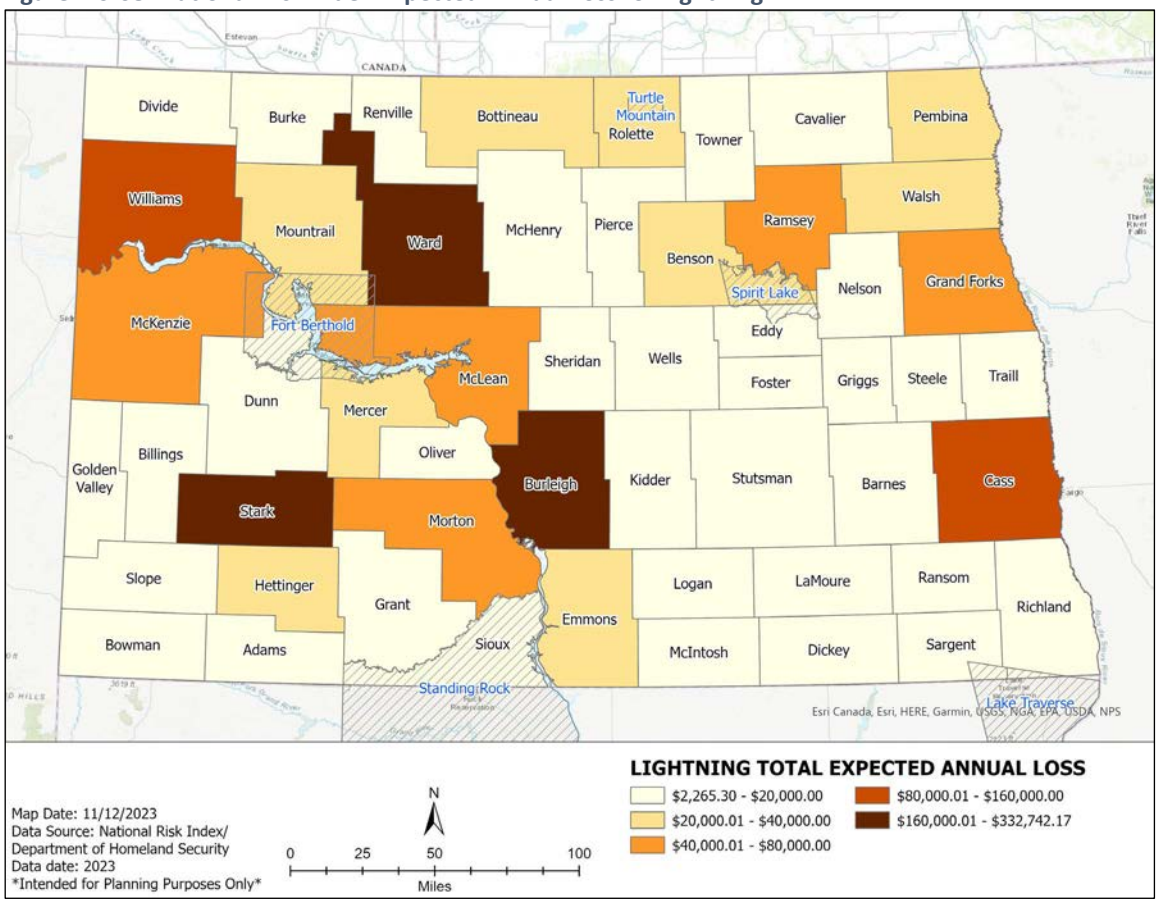
Figure 4.6-67: Annualized Consequences of Wind Events in North Dakota

1955-2022				
Events	**Deaths**	**Injuries**	**Property Damage**	**Crop Damage**
125.4	0.09	1.5	$4,500,846	$3,120,866
2018-2022				
Events	**Deaths**	**Injuries**	**Property Damage**	**Crop Damage**
1680.4	1.2	20	$60,311,340	$41,819,600

Source: NCEI, 2023

Figure 4.6-68 shows the NRI data for expected annual loss from lightning, based on the frequency of occurrence of Cloud-to-Ground lightning strikes, from the NCEI database (NCEI, 2023; NRI, 2023). According to FEMA NRI (2023), Williams, Ward, Stark, Burleigh and Cass Counties each have more than

Figure 4.6-68: National Risk Index Expected Annual Loss for Lightning



Source: NCEI 2023; NRI, 2023

$160,000 in annual expected losses.

As discussed earlier, most of the damages from CG lightning strikes go undetected or unreported. However, there were two reported incidents for significant lightning fatalities, injuries, or damages listed in the NCEI Storm Events Database during the plan update period (NCEI, 2023). One was a fatality of a trail worker, and another was a house fire initiated by lightning.

Figure 4.6-69 breaks down the consequences of tornadoes by magnitude as they are reported in the NCEI database (NCEI, 2023). While weaker twisters (EF0-EF1) are most common, most of the damage occurs from strong (EF2-EF3) to violent storms (EF4-EF5).

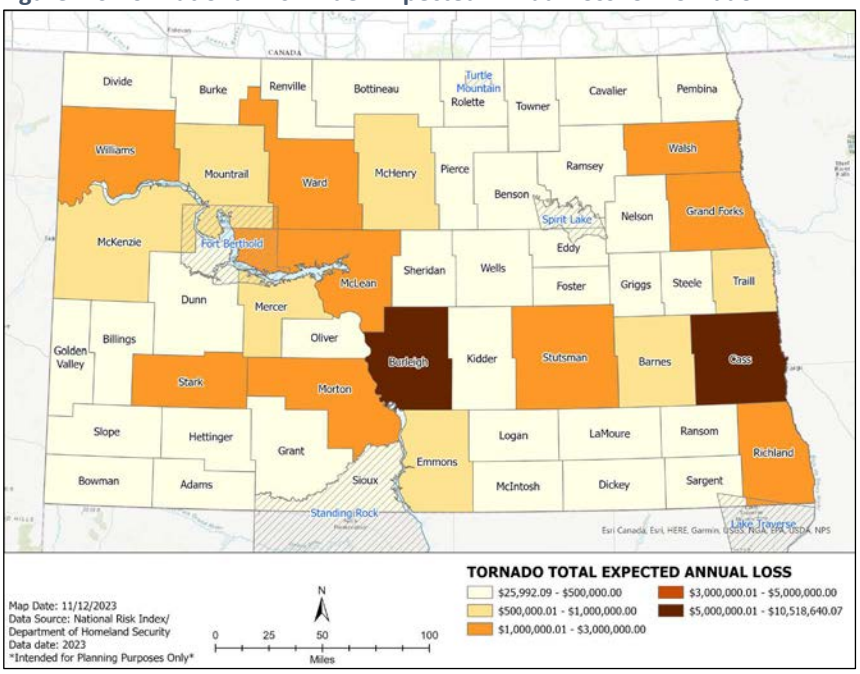
Figure 4.6-69: Consequences of Tornadoes by Magnitude in North Dakota, 1955-2022

Magnitude	Events	Deaths	Injuries	Property Damage	Crop Damage
EF/F0	967	0	4	$ 8,739,370	$ 325,000
EF/F1	390	1	26	$ 23,864,060	$ 4,774,000
EF/F2	146	2	68	$ 35,763,530	$ 6,478,000
EF/F3	41	1	38	$ 29,912,500	$ 505,000
EF/F4	14	10	103	$ 59,125,250	$ 2,100,000
EF/F5	3	12	123	$ 25,500,000	$ UNK
Unknown	119	0	0	$ 1,340,560	$ -

Source: NCEI, 2023

Figure 4.6-70 shows the expected annual loss from tornadoes according to the NRI data, based on strength and frequency of events. Burleigh and Cass counties have more than $5 million in expected annual loss according to the 1996-2019 data used in this loss analysis (NRI, 2023).

Figure 4.6-70: National Risk Index Expected Annual Loss for Tornado



Source: NRI, 2023

Figure 4.6-71 shows the reported annual damages from tornadoes as listed in the historical NCEI database. It compares annualized losses since 1955, in 2023 equivalent dollars, to those during the plan update period of 2018-2022 (NCEI, 2023). According to NCEI (2023), tornadoes have been less deadly and less costly since 2018 than they were across the full data period.

Figure 4.6-71: Annualized Consequences of Tornadoes in North Dakota

1955-2022			
Deaths	**Injuries**	**Property Damage**	**Crop Damage***
0.3	4.6	$9,321,045	$713,068
2018-2022			
Deaths	**Injuries**	**Property Damage**	**Crop Damage**
0.2	5.6	$1,567,072	$27,394

*Source: NCEI, 2023. Note * tornadic crop loss data is back to 1994.*

It should be noted that there were no reported tornadoes of EF3 or greater strength during the 2018-2022 plan update period. These stronger tornadoes are by far the costliest of the tornadic storms in terms of fatalities, injuries, and property damage. The estimated $25.25 million in damages from the Fargo/Cass

County F3 and F5 tornadoes of 1957, would have an equivalent value of $273.71 million in 2023 dollars. That equates to an annualized impact of $4.21 million in property damage alone, nearly half the annualized property damage for the state, not including the immeasurable cost of the 10 lost lives.

4.6.2.10 Community Resilience

People are most vulnerable to the collective severe summer weather hazards when they are exposed outdoors. This makes having the ability to notify citizens of approaching threatening conditions and offering a safe, public space both crucial factors of community resilience so that people can still enjoy recreational and leisure activities but seek safety quickly if necessary.

Mitigation dollars have been invested in 23 communities to install early warning sirens and community safe rooms. **Figure 4.6-72** reports the community, project and source of funding that increased the community's resilience against severe summer hazards.

Figure 4.6-72: Severe Summer Hazard Community Mitigation Projects

Location	Project	Project Funding Source
Grand Forks	Storm Shelter	2017 PDM Grant
McKenzie County	Storm Shelter	2018 PDM Grant
Beulah	Storm Shelter	2018 PDM Grant
Steele County at Golden Lake	Storm Shelter	HMGP DR-4475 Grant
LaMoure County at Memorial Park	Storm Shelter	HMGP DR-4475 Grant
Elgin	Storm Shelter	HMGP DR-4475 Grant
Cavalier County at Mt. Carmel Dam	Storm Shelter	HMGP DR-4475 Grant
Nelson County at Stump Lake	Storm Shelter	HMGP DR-4565 Grant
Silver Lake	Storm Shelter	HMGP DR-4565 Grant
Mountrail County	Storm Shelter	HMGP DR-4660 Grant
Rolette County	Early Warning Siren	HMGP DR-4444 Grant
Mott	Early Warning Siren	HMGP DR-4444 Grant
Minnewaukan	Early Warning Siren	HMGP DR-4475 Grant
Bismarck	Early Warning Siren	HMGP DR-4475 Grant
Bowman Haley at Dam Campground	Early Warning Siren	HMGP DR-4509 Grant
Beaver Lake State Park	Early Warning Siren	HMGP DR-4509 Grant
Bisbee	Early Warning Siren	HMGP DR-4509 Grant
Cando	Early Warning Siren	HMGP DR-4509 Grant
Berlin	Early Warning Siren	HMGP DR-4553 Grant
Lake Lamoure	Early Warning Siren	HMGP DR-4553 Grant
St. Thomas	Early Warning Siren	HMGP DR-4553 Grant
Glen Ullin	Early Warning Siren	HMGP DR-4553 Grant
Rolette County	Early Warning Siren	HMGP DR-4660 Grant

Source: NDDES, 2023

Each city has at least one early warning siren. [Ransom] County has a county-wide reverse 911 system for people who sign up to be notified in case of an emergency. Most mobile homes and most major recreational facilities do not have any designated shelters for people to take cover in case of severe summer weather.

(Ransom County Multi-Jurisdictional Hazard Mitigation Plan, 2021)

4.6.2.11 Future Conditions

This section evaluates how changes in existing conditions may impact severe summer weather and the risks they pose.

Through the end of this century in North Dakota, expect larger, more frequent, and longer duration storms with an increase in intense rain and flooding, and a likely increase in large hail. Information extracted from the NOAA National Centers for Environmental Information, Summary for North Dakota (Frankson, 2022), the Fifth National Climate Assessment (Knapp, 2023), and related resources, provides a basis for the following list:

- **Location:** Severe summer weather will continue to be a threat throughout the state.
- **Extent/Intensity:** Severe summer weather events are likely to increase in size/extent, as higher temperatures with higher moisture availability should produce a larger overall storm footprint. The overall intensity of a storm depends on both stability and shear considerations within the developing storm which may or may not change significantly. However, a larger storm will likely produce a greater impact over a larger area.
- **Frequency:** At any specific location, the number of severe summer weather events is likely to increase due to expected larger size (footprint) storms, even though the number of storm episodes may not increase.
- **Duration:** At any specific location, the duration of severe summer weather events is likely to increase due to expected larger size (footprint) storms, even though the number of storm episodes may not increase.

4.6.2.11.1 Extreme Climate Variability and Climate Change

Through the end of this century, North Dakota's natural yet extreme climate variability will likely continue to be the primary signal within each natural hazard (Frankson, 2022). This may directly or indirectly impact jurisdictions and peoples across the state over days to decades long timescales, while the much more subtle and gradual trends of climate change over the rest of this century are likely to further extend the range of such variability (Knapp, 2023). As studies show, trends and variability could extend beyond that previously documented in the historical record.

Results of [McLean County] community survey indicate that 76 percent of those responding expect heat waves to be likely or very likely in the next five years.

(McLean County Multi-Jurisdictional Hazard Mitigation Plan, 2022)

Recent climate trends have shown, and future projections suggest that the state can expect continued gradual warming in all seasons, with greatest warming in the winter season. Overall precipitation is likely to increase, with a high degree of inter-seasonal and interannual variability which could lead to longer

and stronger droughts interspersed with more frequent and more intense flooding (Swain, 2015). Severe summer season storms will likely continue to occur in both drier, drought-prone periods, and wetter, flood-prone periods within the state's overall extreme climate variability (Easterling, 2017). And though the total number of storms may not change significantly, their overall size and impact likely will.

Extent/Frequency/Duration. Warmer summertime temperatures in conjunction with higher low-level moisture availability, through any combination of moisture transport and local evapotranspiration, produce larger footprint (areal extent) storms, along with larger areas of heavy precipitation. Such storms do not necessarily produce a larger number of distinct severe weather events per storm; however the larger footprint area of the storm equates to a larger areal coverage of any corresponding large hail, and/or damaging wind, and/or tornado event impact area with a corresponding increase in severity, frequency, and duration at any specific location (Gust: personal observation based on CY1999-2022 storms; NCEI/StormData). Likewise, warmer summertime temperatures with lower moisture availability produces smaller footprint storms, smaller areal coverage of distinct severe weather events, and a shorter corresponding duration of such events at any location.

4.6.2.11.1.1 Impacts

Heavy Precipitation (high confidence)

Such events overall are likely to increase, higher increases and confidence in northeast North Dakota and somewhat less in southwest North Dakota, with a commensurate in areal and/or flash flooding, and variable riverine flooding. These precipitation increases do not necessarily have a one-to-one relation with flooding, which is dependent on a variety of precursor conditions (Livneh, 2016), but flooding increases are considered highly likely. Meanwhile, observations show that annual peak streamflow is decreasing in the western North Dakota and increasing in eastern North Dakota (Sando, 2022). Most extreme flooding episodes across North Dakota, including those in the past few decades, have been spring snowmelt flooding caused by a combination of widespread heavy winter season snowfall accumulations and rapid snowmelt runoff, with concurrent warm rainfall as a potential runoff accelerant. However, studies have shown that these recent large floods were caused by natural variability within the local climate system (Hoerling, 2010; Hoerling, 2013; Hoell, 2023). One future climate suggestion is that episodes of heavy convective rainfall concurrent with spring snowmelt flooding could increase through the end of this century.

Hail (medium confidence)

Model projections indicate that hail size, frequency of large hail and length of the hail season should increase through the rest of the 21st century in the Northern Great Plains, in general, with a higher increase in hail risk across southwestern North Dakota and a lesser increase across northeast North Dakota. However, the ability of Global Climate Models (GCMs) to properly replicate the thermodynamic processes typically used in convective weather models is questionable (Raupach et al., 2021). Intuitively this makes sense as this mimics the historical pattern and accounts for potential increases in low-level moisture, convective instability, melting height and wind shear which should create shifts in hail size and occurrence.

Researchers using singular Global Climate Models (GCMs) selected from the CMIP6 (Lepore et al., 2021) and CMIP5 (Trapp et al., 2019) model suites showed similar trends, with similarly high responses using the RCP8.5 emission scenario. Comparing intermediate (RCP4.5) and very high (RCP8.5) scenario projections for severe convection indicates that the projected trends for RCP4.5 are in the same increasing direction, but with a much lower amplitude compared to RCP8.5 (Haberlie et al., 2022). More recent and higher resolution CMIP6 simulations have not yet been reviewed.

Wind and Lightning (medium confidence aggregate)

If the size of storms and related increase in precipitation also includes an increase in hail production/size, then one would expect that downburst wind production potential and lightning potential would also increase, as both are highly correlated to large hail production (Jessup & Burke, 2018). This would likely show up in single cell storms as well as in larger squall lines and derecho events.

Flooding (likely, high confidence)

From the Flood Hazard analysis… Heavy to extreme precipitation events are projected to occur more frequently, increasing the frequency of flood/flash flood events statewide. Flooding due to intense rainfall and concurrent spring snowmelt flooding is most common across the Souris-Mouse River, James River, and Red River/Devils Lake Basins, and is projected to increase.

Analysis of the monotonic trends in peak streamflow across North Dakota indicate that the general increase in flow along and east of the North Dakota Continental Divide (northeastern ND) due in large part to a combination of long-term precipitation increases, multidecadal climate variability, and other unknown but nonsignificant positive influences (Sando, 2022, Fig 3). Southwest of the Continental Divide (southwestern ND) had similar forcings but in the opposite/decreasing trend, with an additional negative trend due to the construction of large artificial impoundments.

Extreme Heat/Heat Index (Likely)

Projected increases in temperature through mid-century, based on a high emissions scenario, would likely increase the number of days with a heat index above 100F by the equivalent of 1-7 workdays, in North Dakota, increasing from northwest to southeast across the state (Dahl, 2021). In the analysis, the increased number of work breaks required by Occupational Safety and Health Administration for outside workers would accumulate as unsafe work time and put worker's earnings at risk. The increase in available workdays due to a projected shorter winter season snow-cover *may* more than offset the loss in time/workdays due to the projected increase in summertime excessive heat.

4.6.2.11.1.2 Adaptation

Certain or proposed future flood adaptation measures may also be considered as mitigation measures, especially those that involve improving precipitation monitoring and forecasting. These systems allow for proactive assessment of precipitation in near-real time and for an enhanced forecasting of and response capability to the threat of flooding. See below.

4.6.2.11.1.3 Mitigation

An increased density of all types of surface-based sensors, including radar and river gages would be desirable, in that higher forecast specificity in time and space requires a higher observation density in time and space (Gust, 2015). For example:

Expanding Surface Observation Systems. Across the state of North Dakota, including the Souris and Red River Basins, there is a steadily increasing density of automated weather/climate monitoring stations like Automated Surface Observing Systems (ASOS)/AWOS (NCEI, 2023), NDAWN (NDAWN, 2023), and NDDWR/PRESENS (NDDWR, 2018) data collection platforms with their respective atmospheric and soil moisture/soil temperature monitoring capabilities. Presently, the Souris/Mouse River Basin remains the most underrepresented for soil moisture and soil temperature gaging systems, in comparison to like mitigation efforts recently initiated across the Red River and Upper Missouri River systems.

Expanding Weather Radar Systems. Radar Gaps are areas with diminished low level radar coverage due to a combination of Doppler-Radar scans limits, curvature of the Earth and radar separations. Lowest

Doppler-Radar scans are at an angle of a fraction of a degree above the horizon, and when coupled with the curvature of the Earth, means that with an increased distance from a radar there is an increasing loss of lower-level radar information and a decrease in radar resolution. Williams County North Dakota installed a supplementary "Gap-Filler" Weather Radar in March 2020 (Williams Co., 2023), for an area of increased population and storm related impacts but otherwise sparse in low-level radar coverage in northwest North Dakota. A similar area of sparse low-level radar coverage persists across southwestern North Dakota, for drainage basins there. NDDWR operates a weather radar in Bowman, North Dakota year-round to fill that southwest North Dakota gap, and there are plans to replace it with a new dual-polarization system in 2024.

Soil Moisture and Temperatures. The U.S. Army Corps of Engineers, in collaboration with the state climate offices, is now establishing a soil moisture and snowpack monitoring network throughout the middle and upper Missouri River Basin, (WRDA, 2020; Spinrad 2021). A total of 529 stations are scheduled for installation between 2021 and 2027 on a 25-square-mile grid at elevations below 5,500 feet. The data from these stations, which include multiple soil moisture and temperature depths and snow depths, will be directly available to NOAA to track and forecast flooding, drought, and other climatic and weather events.

Enhanced Flood Mitigation. Much of the increasing streamflow in eastern North Dakota occurs in the Red River of the North/Devils Lake Basin and has prompted over $3B+ in infrastructure projects through 2020, mainly in the vicinity of Grand Forks and Devils Lake (Todhunter, 2021), with an additional $3B+ committed to infrastructure projects through 2027, to divert flood water around Fargo, North Dakota, and Moorhead, Minnesota (Landers, 2021). The Red River Basin Commission's Long-Term Flood Solutions Plan (RRBC, 2011), and related resources, demonstrate a variety of ways to improve basin-wide resiliency.

4.6.2.11.2 Other Changes

The urban areas of the state are anticipated to have a 24.6 percent growth rate between 2020 and 2040 (U.S. Census Bureau, 2020). Areas in and near Fargo, Grand Forks, Bismarck, and Williston will see more infill development and development on their fringe and nearby smaller communities, increasing the amount of property and people in the way of severe summer weather. Urban development that is outpacing annexation can lead to increased residential density in areas where newer building codes are not in force, creating homes that are less resilient to severe summer weather.

The western North Dakota Counties of Dunn, McKenzie, Mountrail, and Williams have grown at a rate of 72.3 percent since 2010 (U.S. Census Bureau, 2020), and growth is expected to continue at a rate of 54.9 percent. This has already led to new development in areas like Williston, Minot and Dickinson and the rural areas between them. Accommodating the booming oil and gas workforce and their young families will increase development and critical infrastructure in these areas, placing more people and property at risk from harm from severe summer weather.

Technological advancements in meteorology, such as the addition of Doppler weather radars is just one way in which technology has helped to increase the accuracy and warning time of severe summer weather forecasts and warnings.

Figure 4.6-73, Radiosondes are weather balloons that take trips into the upper atmosphere to collect data at least twice a day (NOAA NWS, 2017). Automated weather stations at area airports such as the NWS's Automated Surface Observing System (ASOS) and the FAA's Automated Weather Observing System (AWOS), the North Dakota Agricultural Weather Network NDAWN, the USFS's Remote Atmospheric Monitoring System (RAWS), and the broad network of cooperative weather observers provide data to local meteorologists from an increasingly detailed geographical basis. The Advanced

Figure 4.6-73: Radiosonde launch in Bismarck.

Source: NWS-BIS,

Weather Information Processing System is the advanced computer processing system that the NWS uses to process information from these tools to give faster and more accurate warnings about severe weather than what existed even a decade ago, allowing more time for people to find shelter, cease outdoor activities and remove items that may be damaged by strong winds.

North Dakota's Department of Water Resources is using technology to try to reduce hail damage through its Cloud Modification Project in Bowman, Slope, McKenzie, Williams, and Mountrail counties (NDDWR, 2023). North Dakota joins Texas and Alberta as the other warm-weather programs of this type. According to the North Dakota DWR (2023), aircraft release silver iodide or dry ice, which can quickly produce ice crystals, into approaching thunderstorms to increase the cloud condensation nuclei and increase the number of smaller drops that are able to form from available cloud water droplets, thus reducing aggregation into larger hail stones.

The NWS also engages communities in resilience programming to help them prepare for and communicate about severe weather, called StormReady (NWS-StormReady, 2023). In North Dakota, all 53 counties, 43 municipalities, and six tribal governments or institutes of higher education have met the standards that include developing an emergency operations center, redundant emergency alert systems, local weather monitoring, public readiness activities and weather planning. North Dakota participants in the StormReady Program are shown in **Figure 4.6-74**.

Figure 4.6-74: StormReady North Dakota Participants, 2023

Counties		Communities		Others
Adams	McLean	Amidon	Mandan	Standing Rock Sioux Tribe
Barnes	Mercer	Ashley	Manning	Turtle Mountain Chippewa Tribe
Benson	Morton	Beach	McClusky	North Dakota State University
Billings	Mountrail	Belcourt	Medora	United Tribes Technical College
Bottineau	Nelson	Bismarck	Minot	University of Mary
Bowman	Oliver	Bottineau	Mohall	University of North Dakota
Burke	Pembina	Bowbells	Mott	
Burleigh	Pierce	Bowman	Napoleon	
Cass	Ramsey	Carrington	New Rockford	
Cavalier	Ransom	Carson	Rolla	
Dickey	Renville	Center	Rugby	
Divide	Richland	Crosby	Sheyenne	
Dunn	Rolette	Dickinson	Stanley	
Eddy	Sargent	Ellendale	Stanton	
Emmons	Sheridan	Fargo	Steele	
Foster	Sioux	Fessenden	Towner	
Golden Valley	Slope	Fort Yates	Wahpeton	
Grand Forks	Stark	Harvey	Washburn	
Grant	Steele	Hettinger	Watford City	
Griggs	Stutsman	Jamestown	West Fargo	
Hettinger	Towner	LaMoure	Williston	
Kidder	Traill	Linton		
LaMoure	Walsh			
Logan	Ward			
McIntosh	Wells			
McHenry	Williams			
McKenzie				

Source: NOAA NWS, 2023

4.6.3 Risk Analysis

Risk can be defined as the potential for loss of or damage to an asset (FEMA EMI, 2023). This section analyzes the potential for loss or damage in the state of North Dakota.

4.6.3.1 National Risk Index (NRI)

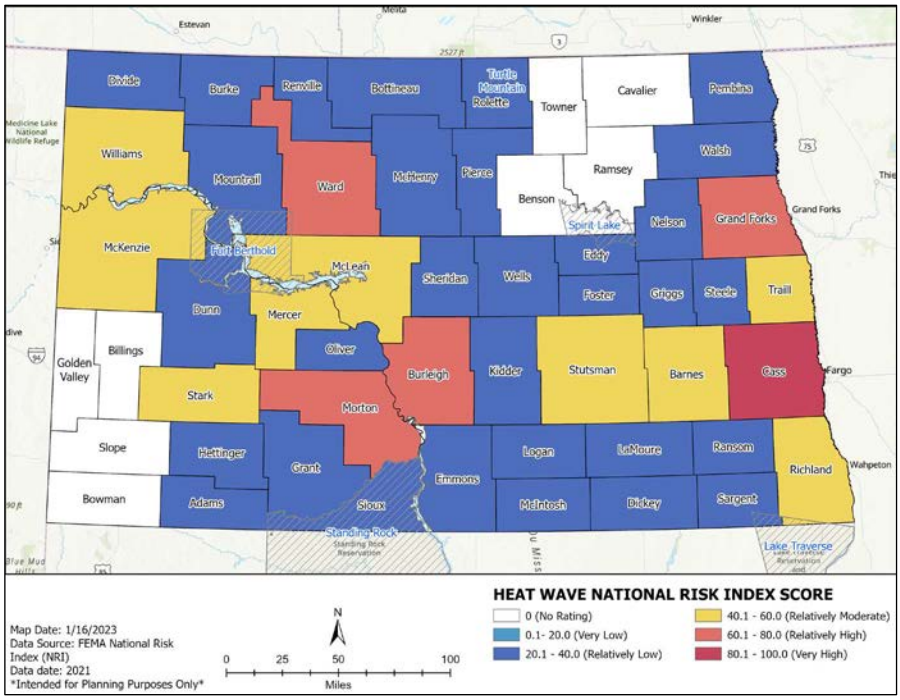
The National Risk Index leverages available source data for natural hazard and community risk factors to develop a baseline risk measurement for each United States County and Census tract. The risk equation behind the Risk Index includes three components: a natural hazards component (Expected Annual Loss), a consequence enhancing component (Social Vulnerability), and a consequence reduction component (Community Resilience). The dataset supporting the natural hazards component provides estimates measured in 2022 United States dollars. The datasets supporting the consequence enhancing and consequence reduction component have been standardized using a minimum-maximum normalization approach prior to being incorporated into the National Risk Index risk calculation. Using these three components, composite Risk Index values and hazard type Risk Index values are calculated for each community (county and Census tract) included in the Index. Risk Index values form an absolute basis for measuring Risk within the National Risk Index, and they are used to generate Risk Index percentiles and ratings across communities. Categories of risk are determined by using quintiles to determine categories, between 0.0 and 100.0, where risk scores are relative to other counties nationally.

The NRI, as described above, is different than the probability of occurrence of these phenomena (FEMA, 2023). North Dakota, given its Great Plains location, has a high probability of various severe summer weather phenomena. However, summer severe weather events have an overall smaller coverage area than winter events. On average, North Dakotans have a lower overall social vulnerability regarding these hazards and an overall high level of community resilience, especially among the more rural and lower population counties where a singular severe wind, hail, or tornadic event causes less monetary impacts. In contrast, the higher NRI scores tend to skew towards higher population areas.

Figures 4.6-75 through **4.6-79** display the NRI Risk Scores for severe summer weather (FEMA NRI, 2023).

Figure 4.6-75 shows the risk score for heat waves. Most of the state is considered to be in the two lowest risk categories for heat waves, while areas with higher population totals have more risk due to their generally greater social vulnerability and the possibility of increased urban heat island impacts.

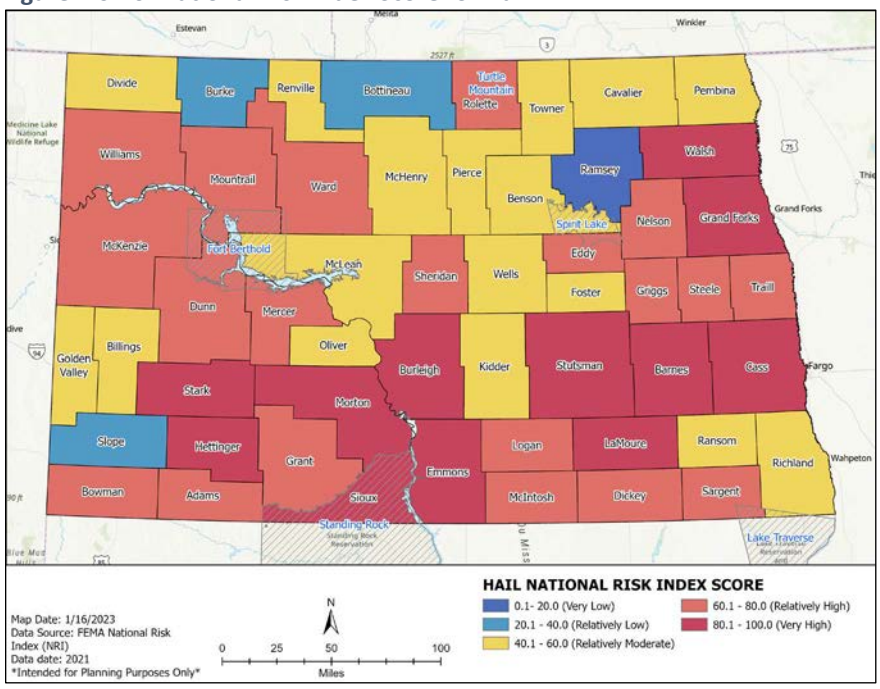
Figure 4.6-75: National Risk Index Score for Heat Waves



Source: NRI, 2023

Risk scores for hail are shown in **Figure 4.6-76** (FEMA NRI, 2023). Risk across the area varies greatly in the dataset with four counties earning low to relatively low risk scores and 32 of 58 counties with a relatively high to very high risk, NRI scores exceeding 60. Note, NRI scores are not adjusted for any impacts due to cloud modificatio/hail suppression activities in or around any western ND counties.

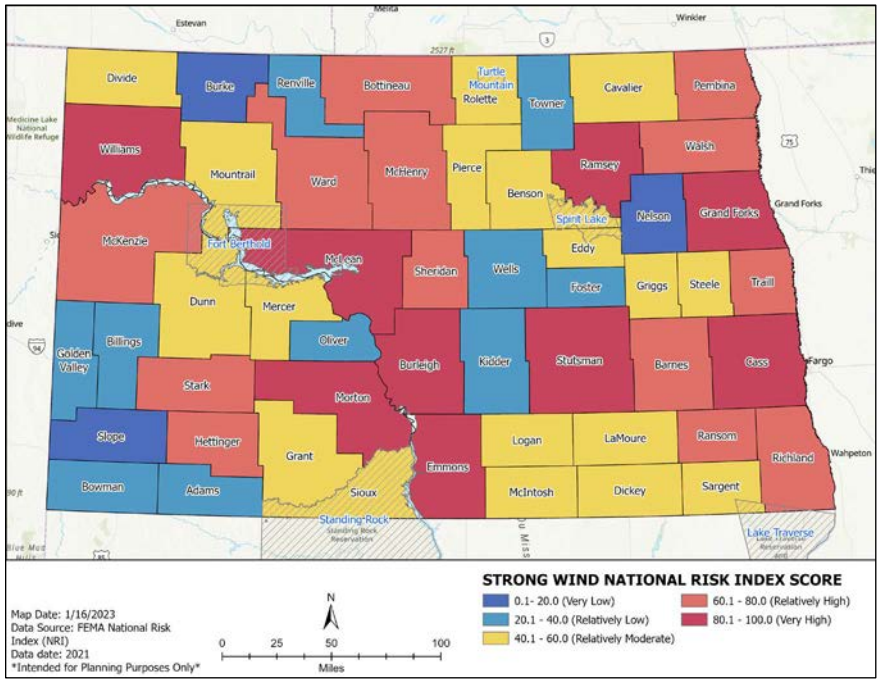
Figure 4.6-76: National Risk Index Score for Hail



Source: NRI, 2023

The NRI scores for strong (Damaging Thunderstorm) wind are also highly variable across the state, with risk skewed towards higher population and higher summer recreation and residence areas. Most of the state fell in the moderate to relatively high-risk groups, as shown in **Figure 4.6-77**.

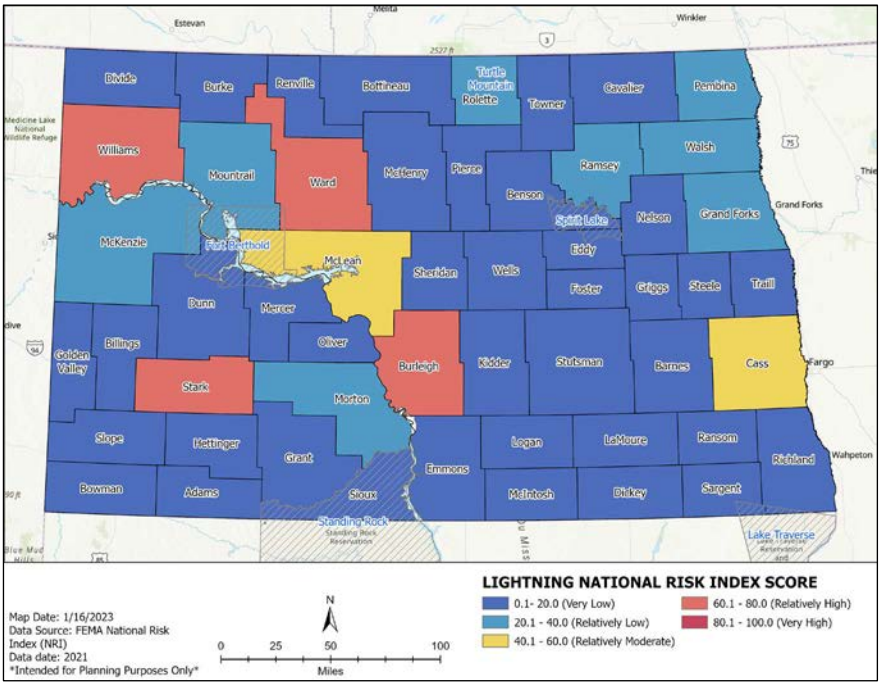
Figure 4.6-77: National Risk Index Score for Strong/Damaging Wind



Source: NRI, 2023

Lightning risk in the state, based on Cloud-to-Ground strikes, is generally low to relatively low, as shown in **Figure 4.6-78** (FEMA NRI, 2023). In the more arid western half of the state, there is an increased risk of higher based storms with an increased risk of As designed, the higher populated areas throughout the western half of the state show an elevated risk in the NRI dataset.

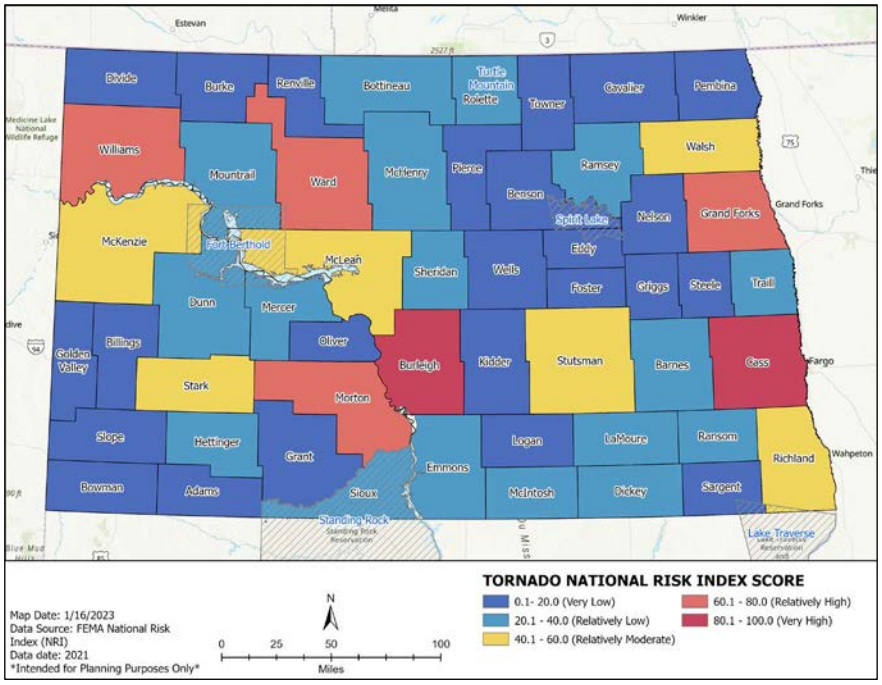
Figure 4.6-78: National Risk Index Score for Lightning



Source: NRI, 2023

Figure 4.6-79: National Risk Index Score for Tornadoes

Figure 4.6-79 shows the risk scores for tornadoes (FEMA NRI, 2023). As designed, this risk landscape tracks closely with population exposure.



Source: NRI, 2023

4.6.3.2 Risk Index Score

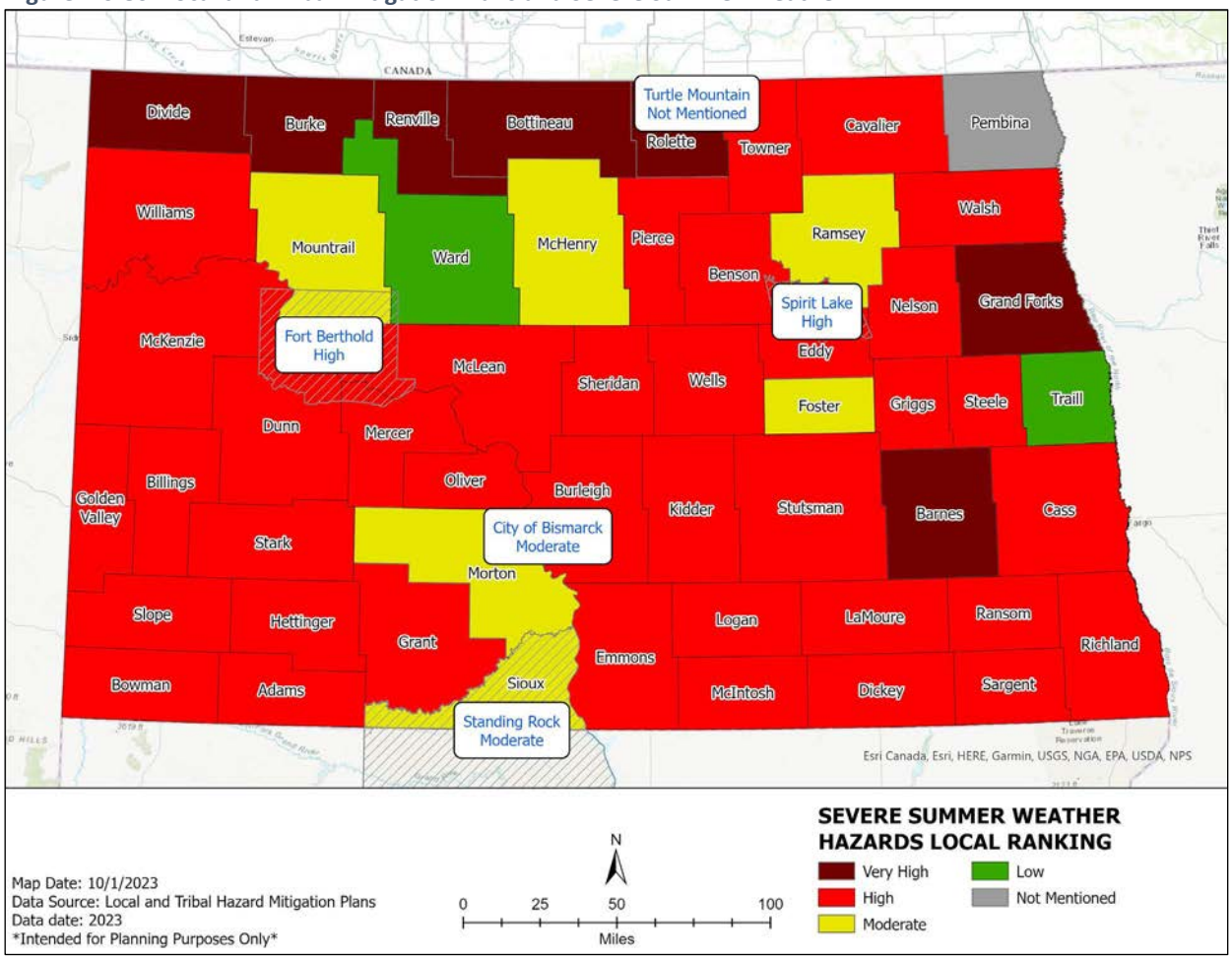
The Priority Risk Index for this plan update ranks severe summer weather as a high risk with a score of 3.1. This ranks severe summer weather as 6 out of 15 hazards.

4.6.3.3 Jurisdictions at Risk

Figure 4.6-80 shows how the state's local and tribal hazard mitigation plans evaluated severe summer weather. When evaluating local and tribal mitigation plans 56 of 58 of the jurisdictions identify severe summer weather as a hazard impacting their jurisdiction. However, of all plans that ranked hazards, 46 considered it a high or very high risk.

> Tribal communities experience prolonged response from emergency services due to location and blocked roads.
>
> *(Sioux County/Standing Rock Sioux Tribe Hazard Mitigation Plan, 2016)*

Figure 4.6-80: Local and Tribal Mitigation Plans and Severe Summer Weather



Source: NRI, 2023

4.6.4 Summary/Conclusion

The following bullets summarize highlights and conclusions related to severe summer weather.

- Severe summer weather refers to seven unique hazards that have similar, yet distinct, characteristics, which include thunderstorms, tornadoes, lightning, high winds, hail, excessive heat, and downbursts.
- Of the severe summer hazards, North Dakota has a higher probability of experiencing lightning and thunderstorms, but less probability of experiencing the others. All the severe summer hazards can occur anywhere statewide.
- The elderly, chronically ill, and outdoor workers are particularly vulnerable to severe summer weather.
- New building methods and technologies make structures more resilient to severe summer weather, but older homes and manufactured homes are still vulnerable to summer hazards.
- Building residential and commercial properties and facilities to the highest standards following the most current building codes, utilizing more durable materials can result in greater resilience to severe summer hazards. FEMA provides guidance on how to add “near-absolute” levels of protection to residential and public buildings via their safe room’s guidance.
- Hail and excessive heat can destroy the multiple crops grown across the state causing disruption to the local economy, but the collective severe summer hazards can create the greatest economic losses to the State’s tourism industry.
- Most property damage from hail comes from large hailstones, but smaller stones can do significant damage to crops.
- Recent years have shown increased losses from strong winds but decreased losses from tornadoes.
- Technological advancements, mitigation projects and readiness programs have helped build resilience to severe summer weather.
- All but two jurisdictions in the state recognize severe summer weather as a risk and have planned mitigation actions to decrease the risk to residents.

4.6.5 Data Limitations

All data in the severe summer weather hazard profile was supplied from a variety of state, local and federal sources. Of the collective hazards addressed in the severe summer weather hazard profile, not all hazards have been recorded as thoroughly and for as long a historical duration as others. For example, historical tracking of tornadoes and tornadic events is much more comprehensive than that of downburst events. Additionally, neither private nor municipal data was included for this state-level plan and may provide additional, supplemental insight had it been included.

4.7 Infectious Diseases and Pest Infestations

4.7.1 Overview

This section examines the risks posed by infectious disease and pest infestations as they would impact the state of North Dakota and its people, property, and operations. Infectious diseases may occur in humans, animals, or plants. There is some overlap between this section and others. Infectious disease can spread due to a terrorist or criminal attack, and pests and animal disease can occur as a side effect or be catalyzed by climate hazards such as drought and wildfire.

4.7.1.1 Description

Infectious diseases, according to the CDC, are "illnesses caused by germs (such as bacteria, viruses, and fungi) that enter the body, multiply, and can cause an infection" (CDC, 2023). Zoonotic means "a disease that is spread between animals and people".

As defined by the European Environment Information and Observation Network (EIONET), a pest infestation is "the occurrence of one or more pest species in an area or location where their numbers and impact are currently or potentially at intolerable levels" or "a sudden increase in destructiveness or population numbers of a pest species in a given area" (EIONET, 2023).

It is not possible to determine which human, animal, and plant diseases or other infestations would require state resources over the next five years. The COVID-19 pandemic demonstrated in 2019 through 2023 that the largest threat to human health may be from a disease currently unknown to the world. However, there are some known and emerging threats and some lessons learned from past threats that can help the state better prepare for future threats known and unknown. Some of those threats are described in the plan below.

4.7.1.1.1 Human

Common infectious diseases: There are 75 individual reportable infectious diseases among humans that can lead to death or serious illness. Roughly 20 of these have an individual vaccine that can reduce symptoms and/or increase resistance to contracting the disease. Discussed in this plan are influenza and pneumonia which are present throughout the nation, with numerous strains and peak seasons annually during the winter. COVID-19 emerged as a significant public health threat since the last plan update, while novel

COVID-19 Pandemic and Indirect Impacts

The COVID-19 global pandemic demonstrated that the indirect consequences of a widespread infectious disease can be as difficult as the disease itself. Workplace shutdowns and restrictions initiated to stop the spread of the disease led to skyrocketing unemployment and economic impact. Supply-chain issues created shortages of essential goods such as infant formula. The need for medical care demonstrated the limits of healthcare systems and impacts of stress in healthcare professionals. The State Hazard Mitigation Team considered addressing supply-chain shortages as a separate hazard but decided that it was a scary and common consequence that could occur as a result of many hazards including infectious disease (COVID-19).

to the world and without treatment or prophylactic treatment initially, vaccines and treatment are now available to lessen the impacts of the disease. COVID-19 has not been the only coronavirus to emerge as a threat. Previous worldwide threats of Middle Eastern Respiratory Syndrome (MERS) and Severe Acute Respiratory Syndrome (SARS) emerged from other coronaviruses. Tuberculosis outbreaks occur in the state periodically and there have been cases in the state each year since the last plan update, although a positive latent case does not mean the infected person is symptomatic or ever will be (CDC, 2023). Measles and mumps are less common since the emergence of vaccinations in the last century but are becoming more common as vaccination rates decline. Malaria cases have increased as foreign travel to areas where malaria is common increases.

Sexually Transmitted Infections: Diseases that are passed through the exchange of bodily fluids during unprotected sexual contact or sharing of intravenous needles include gonorrhea, chlamydia, syphilis, hepatitis, and the human immunodeficiency virus (HIV). There are other sexually transmitted infections that spread through the state that have less immediate impacts and are not covered in this plan, such as the human papillomavirus (HPV), for which vaccines are available.

Foodborne Illness: Food and water can serve as host to bacteria or fungus that can cause disease or illness in humans or animals. Among those present in North Dakota are Shiga toxin-producing E. coli (STEC) infections, typically found from exposure to human or animal waste, and Legionnaires Disease, which can be found in stagnant or otherwise infected water, including drinking water systems and recreational water such as hot tubs.

Emerging or Foreign Diseases: In addition to threats caused by coronaviruses, there are several emerging human health threats that have developed or become more prevalent since the last plan update. The state must also be prepared to combat novel diseases without a known treatment, such as what emerged during the COVID-19 pandemic. Multi-drug resistant organisms (MDRO) are fungi and bacteria that are resistant to antibiotics or other treatments and may cause permanent negative health impacts or death. West Nile virus is a mosquito-borne illness that can be harmless in some people but can cause serious illness or death in others. Lyme Disease is spread through bites from the deer tick, and while not yet prevalent in North Dakota, it can cause damage in the nervous system, heart, and joints (NDHHS, 2016). Mpox, previously known as monkey pox, emerged as a threat nationally in 2022, spreading through skin-to-skin contact, primarily sexual contact with a person with an active infection as shown in **Figure 4.7-1** (CDC, 2023). Spread has also occurred through needle exposure in healthcare, tattoos, and piercings.

Figure 4.7-1. Mpox Lesion

Source: CDC, 2023

4.7.1.1.2 Animal

Diseases Primarily Present in Wild Game: Two diseases detected in North Dakota wild game that pose potential risk to livestock and humans include chronic wasting disease (CWD) and epizootic hemorrhagic

disease (EHD). Neither pathogen has been detected in humans, but it is not recommended to consume diseased animals. CWD is an always fatal, neurologic disease of cervids caused by a prion. Epizootic Hemorrhagic Disease (EHD) is a viral disease transmitted by midges that frequently causes mortality in white-tailed deer but has also been detected in mule deer, pronghorn, cattle, bison, elk, and bighorn sheep.

Diseases Primarily Present in Bovine and Equine Livestock: Anthrax, Equine Infectious Anemia, and Brucellosis are diseases that pose a threat to horses and cattle due to their exposure to other animals in the pasture and exposure to infected animals in their herd.

Diseases Primarily Present in Poultry or Wild Birds: Highly Pathogenic Avian Influenza (HPAI) is a contagious disease that can affect wild birds and poultry and has affected cattle and human health in rare outbreaks.

Emerging Threats: H1NI Influenza, or Swine Flu, causes flu symptoms in swine and humans; additional strain can pose current or future risk to human health. While typically only found in farmworkers who work with infected swine, an outbreak in 2006 rose to a common human infection and was deemed a pandemic by the CDC (CDC, 2023). Rabies is a lethal disease in humans and other mammals caused by the bite of an infected animal. If bitten or scratched by wildlife or an infected animal, immediate treatment can prevent the disease if caught before symptoms emerge.

The COVID-19 pandemic resulted in seven fatalities in Eddy County as of December 2, 2022. Approximately 22.5 percent of Eddy County residents contracted the disease as of October 2021.

(Eddy County Multi-Jurisdictional Hazard Mitigation Plan, 2023)

4.7.1.1.3 Plant

Plant Disease Present in North Dakota: A wide variety of plant diseases can impact North Dakota's agricultural industry. Modern agriculture has provided chemical and organic solutions for many of these. Rust disease in wheat and potatoes and blight are two commonly persistent plant diseases in North Dakota agriculture (NDSU, 2023). Cyanobacteria in waterways, especially ponds and other stagnant waters are an algae bloom that can create toxins that impact human and animal water sources and can cause water-borne illness. They are more common in drought conditions (CDC, 2023). While not specifically discussed in this plan, there are other contaminations of chemical, mold, and bacteria that could impact waters in the state.

Emerging and Foreign Threats: A plant disease that has not infected North Dakota flora, but that has been spreading internationally in the global wheat supply is Karnal Bunt Disease, which was first discovered in India and is now present as near as Arizona (CDC, 2023). Unknown threats may still emerge.

4.7.1.1.4 Pests

Many sectors and individuals have been impacted by adverse effects from infectious diseases that impact humans, animals, and plants. With an increased amount of adult grasshoppers, there was increased crop damage due to the grasshoppers eating and damaging crops. Variable climatic conditions including this one continues to impact farmers and ranchers across the state as found during the Adam's County Community Coffee.

Pests Common to North Dakota Wheat: Aphids are green insects that come to North Dakota in late spring from warmer areas south of the state with saliva that is toxic to small grains. The next pest to arrive are Armyworms, who feed and reproduce in the lower parts of grains. The pale western cutworm affects western North Dakota, and the dingy cutworm prefers eastern North Dakota. In each, the moth lays her eggs in the summer, and the larvae feast on the wheat. The dingy cutworm moth prefers sunflower heads for her offspring, so crops following sunflowers in infested fields are particularly at risk. Grasshoppers are extremely common with peak hatch occurring around mid-June, with the feeding of nymphs and adults increasing from July into August and are bolstered by drought conditions and dry periods. Wet conditions delay the development of the species, keeping populations manageable. Hessian flies are particularly prevalent in winter wheat in juvenile form but do the most damage as adults over the summer. They thrive during delayed plantings due to wet soil. Northern farms in the state have battled the insect since 1996. Cereal leaf beetles are an invasive European pest with confirmed cases in Burke, Cavalier, McKenzie, Nelson, Renville, Ward, and Williams Counties (North Dakota State University (NDSU) Extension Service, 2021). They feast on the leaves of cereal grains.

Pests Common in North Dakota Corn: Some common corn pests are shared with wheat, such as cutworms, aphids, grasshoppers, and armyworms, but corn crops face some additional pests. Corn rootworms injure corn as larvae in the roots and adults feed on the husks and silk. The European corn borer can reproduce two generations a season. Spider mites that thrive in dry, hot weather are as small as dust specks and can yellow a plant quickly (NDSU Extension Service, 2021). White grubs and wireworms can be prevalent in fields previously serving as pastureland.

Emerging Threats: Emerald Ash Borers can be devastating to trees and, while not yet found in North Dakota, the insects have been found in neighboring Manitoba, Canada; Minnesota, South Dakota, and other Midwestern states (CDC, 2023).

4.7.1.2 Previous Occurrences

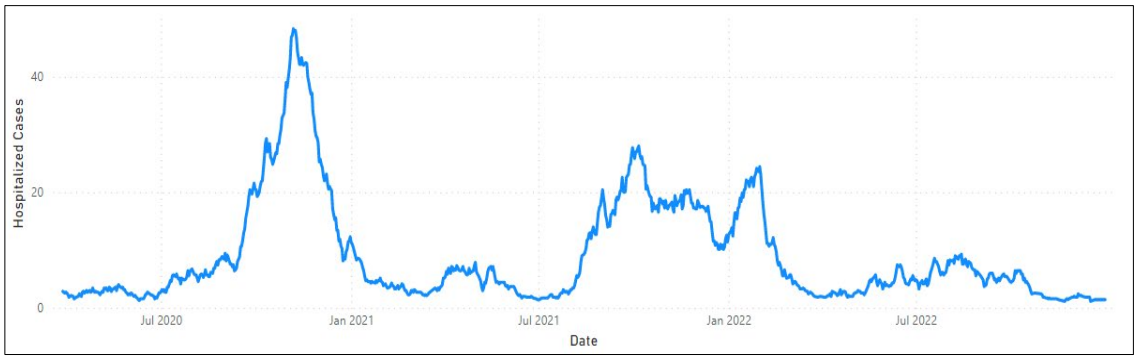
The following section describes notable and recent events of infectious diseases and pest infestations in the state of North Dakota.

4.7.1.2.1 COVID-19 Pandemic

On March 11, 2020, the World Health Organization declared COVID-19 to be a global pandemic, and the nation followed on March 13, 2020. The emergency officially ended in the United States on April 10, 2023, and worldwide on May 5, 2023. The incident period for EM-3477-ND, issued for the entire state at the onset of COVID-19, spanned nearly four years, ending on May 11, 2023. As conditions deteriorated,

North Dakota received a federal declaration on April 1, 2020, which also ended May 11, 2023.. Three Affiliated Tribes of the Fort Berthold Reservation also received an emergency declaration for COVID, EM-3512, which ended May 11, 2023. However, COVID-19 continues to spread among Americans and North Dakotans, and in some cases poses a fatal threat to those who are unvaccinated or live with underlying

Figure 4.7-2: COVID-19 7-Day Rolling Average of Hospital Admissions in North Dakota



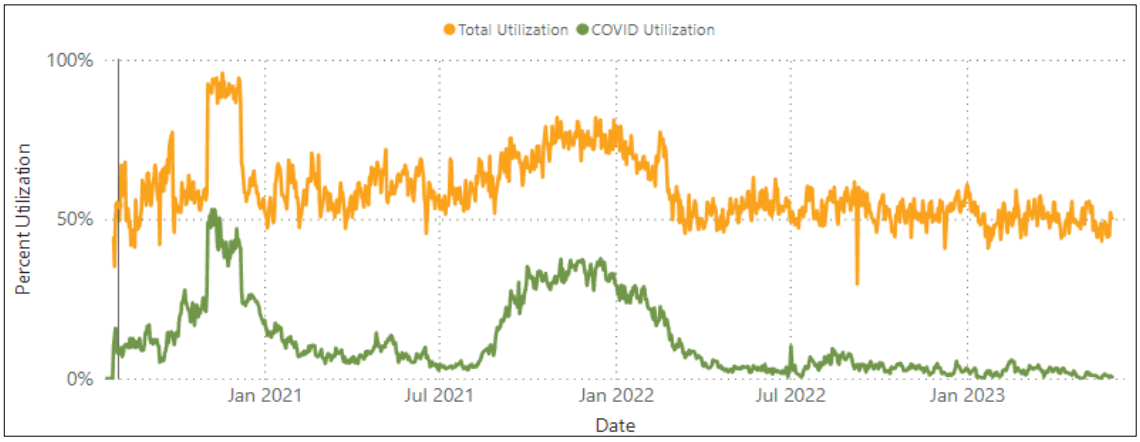
Source: North Dakota Department of Health and Human Services, 2023

conditions (NDHHS, 2023). From March 2020 to December 31, 2020, 282,456 cases of COVID-19 were reported to NDHHS as shown in **Figure 4.7-2**. In the same period, there were 8,902 hospitalizations and 2,066 deaths from the novel coronavirus. As we see from the data, there were over 270,000 people diagnosed that were not hospitalized.

North Dakota identified its first COVID-19 case and recorded its first death in March 2020, leading to the closure of schools and limiting of public gatherings to stop the spread. Additionally, elective surgeries were canceled, in-person clinic visits were limited, and telehealth services were expanded (NDHHS, 2022). The impact on business from regulatory shutdowns and supply chain issues led to several state and federal relief actions designed to alleviate economic suffering, including student loan relief, and the expansion of Medicaid, unemployment benefits and Supplemental Nutritional Assistance Program (SNAP). Businesses began re-opening in late spring 2020, although schools continued to operate through distance learning exclusively, while state agencies worked to deliver lunch services to those students who qualified for free lunches at school.

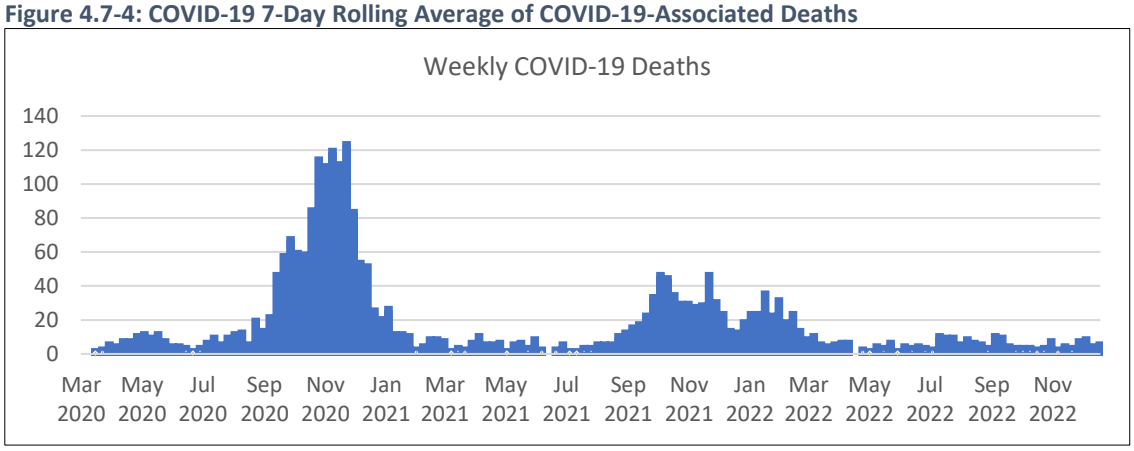
Infections were not uniform during the pandemic, creating spikes in the need for medical care and available hospital beds that taxed local resources as shown in Figure 4.7-2, above. The Fall 2020 spike pushed ICU bed utilization near state capacity as shown in **Figure 4.7-3** (NDHHS, 2023). Vaccines were not available in North Dakota until December 14, 2020, about the time when hospitalizations and deaths peaked in North Dakota.

Figure 4.7-3: Hospital ICU Bed Utilization in North Dakota Facilities



Source: North Dakota Department of Health and Human Services, 2023

Figure 4.7-4: COVID-19 7-Day Rolling Average of COVID-19-Associated Deaths

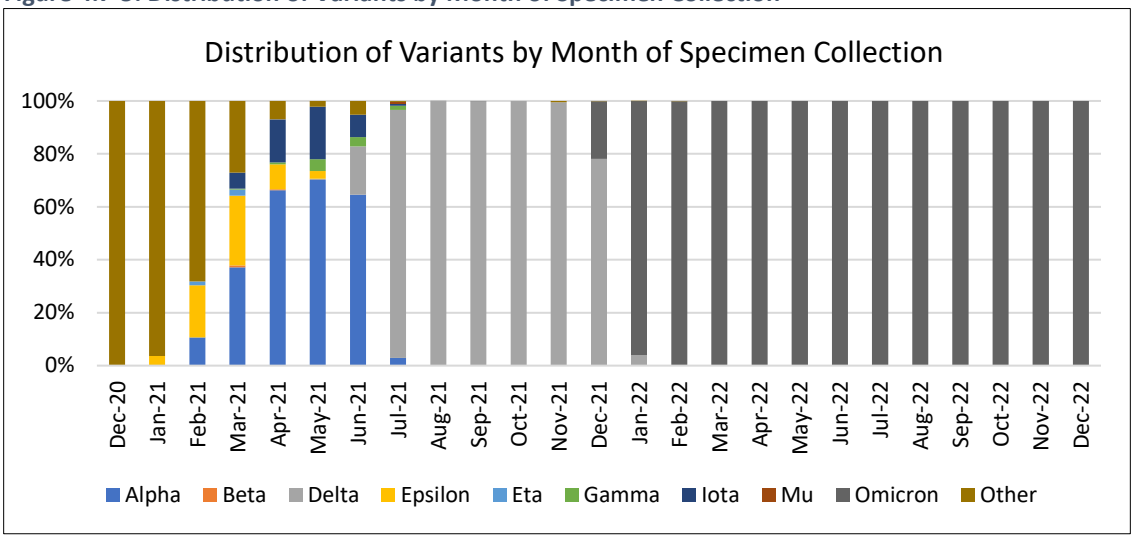


Source: North Dakota Department of Health and Human Services, 2023

Although North Dakota COVID-19 cases peaked in January 2022, the state was in a better position to deal with the situation because vaccines and treatments were more readily available leaving North Dakota positioned to respond when the peak hit (UND School of Medicine and Health Sciences, 2023). Deaths reported to the North Dakota Department of Health and Human Services showed a pattern similar to that of hospitalizations, with an early virus peak during the Fall 2020 season, and a smaller peak as the Delta and Omnicron variants emerged, October 2021 through January 2022 (NDHHS, 2023), as shown in **Figure 4.7-4**. Indoor activities were likely a factor in these peaks as people congregate in indoor areas, increasing transmission.

Mutations of the virus occurred during the global pandemic, and variations of the virus were dominant at different periods of the pandemic as shown in **Figure 4.7-5**. Throughout 2022 and extending into 2023, Omicron and its subvariants have been dominant (NDHHS, 2023). According to Katella (2023), the World Health Organization (WHO) considers omicron to be a variant of concern, and vaccinations have been updated to better protect from this strain, which the CDC says is more transmissible than previous strains but had fewer accompanying hospitalizations and deaths than previous variants.

Figure 4.7-5: Distribution of Variants by Month of Specimen Collection

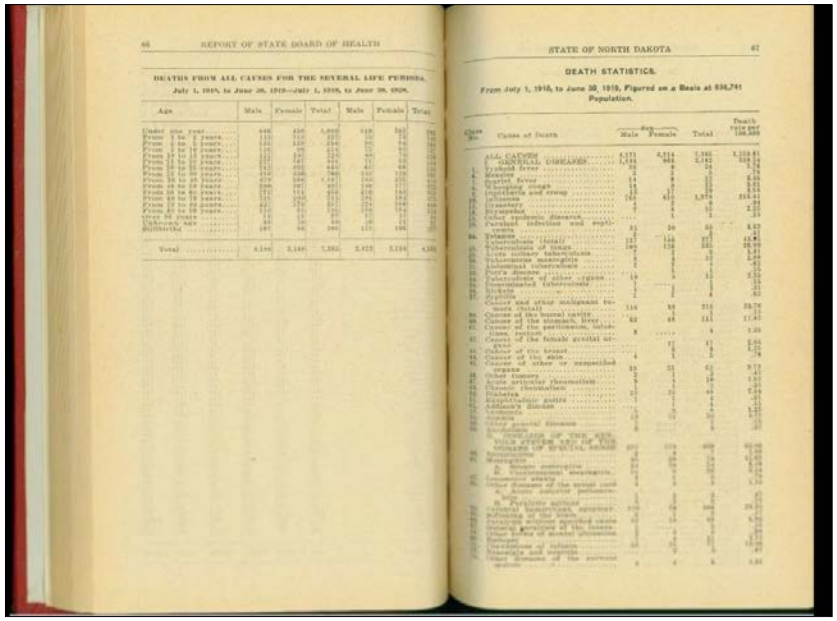


Source: North Dakota Department of Health and Human Services, 2023

Vaccines are reported to have reduced the rate of infection by 50 percent and reduced the rate of hospitalizations by 50 to 66 percent when compared to unvaccinated cohorts (NDHHS, 2023). Vaccines were sent in bulk to the state, which then had the challenge of distributing the vaccines to areas where they were needed. Vaccines needed ultra-cold freezers, which were often unavailable in rural areas, limiting vaccination sites in these areas, especially for those who had limited means to travel to population centers (UND School of Medicine and Health Sciences, 2023). In addition, fewer national resources are available for individuals and hospitals to address the disease. For those without medical insurance, this can negatively impact decisions for testing and treatment.

North Dakota experienced two waves of the Spanish Influenza epidemic in 1918 and 1920. The 1918 outbreak in North Dakota began in Fargo in late September 1918, with unexpected lethality for people between 20 and 35 years old. Much as in modern day, schools and gathering places, including churches, shuttered to stem the spread of the disease that took more than 500,000 American lives and sickened 20 million (The Forum, 2005). According to the Report of (ND) State Board of Health, a total of 1,378 North Dakotans died of influenza between 1 July 1918 and 30 June 1919, versus 9 persons in the previous 12-month period (State Historical Society of North Dakota, 2023). The second wave came in early 1920, prompting a return to limiting social gatherings after an outbreak began at the North Dakota Agricultural College (now NDSU). Emergency field hospitals were opened in Grand Forks and Stark County and businesses were forced to limit patrons (Prairie Public, 2021). Dances and after-school activities were canceled. Some areas with especially prolific outbreaks went into complete shutdown, including Stark and Stutsman Counties.

Figure 4.7-6: Report of (ND) State Board of Health, July 1918 - 30 June 1919.



Source: State Historical Society of North Dakota (SHSND), 2023

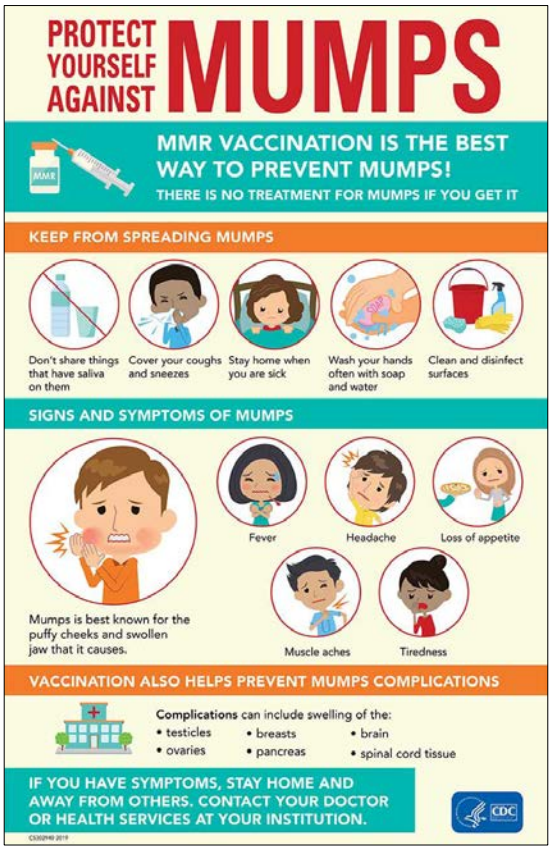
4.7.1.2.2 Human Disease

The following are descriptions of notable or recent occurrences of human disease in North Dakota.

The last outbreak of Measles in the state occurred in 1986, when 25 people in nine counties tested positive for the disease. Local health officials encouraged parents to keep children from crowded areas, including churches and movie theaters. Unvaccinated children were encouraged not to attend school or daycare. A prom was canceled near Grand Forks, and the state track meet was in peril until the week of the event, the Grand Forks public health officials determined that after-school activity bans had reduced the spread of the disease. The differing guidance from one county to the next was seen as a contributor to the outbreak (Prairie Public, 2021). In response, the North Dakota Legislature passed a law that allowed state health officials to determine the control measures for outbreaks, which was next used for the COVID-19 pandemic.

In October 2022, a public-school student in a rural community was diagnosed with an infectious active tuberculosis infection. The local public health unit conducted contact tracing and provided testing to identified contacts (Harbo, 2022). The unit also recommended testing to anyone in the K-12 school system, providing a day for free screening.

Figure 4.7-7: Mumps Symptoms and Protection



Source: CDC, 2019

North Dakota has experienced several outbreaks of mumps in the past few years. In 2016, the state reported 49 cases after experiencing just 46 in the previous 15 years combined (NDHHS, 2023). Cases of the disease remained relatively high until social distancing and masking from COVID-19 began, and mumps rates returned to the pre-2016 normal.

Between 2009 and 2019, there were no cases of congenital syphilis reported in North Dakota, but three cases were reported to the state in 2020, two in 2021 and two in 2022. Congenital syphilis more than quadrupled from 2013 to 2020 nationally (NDHHS, 2023). Proper screening and treatment of the mother is essential. Untreated infants are likely to suffer both physical and intellectual disability.

Shiga toxin-producing E. coli (STEC) is an infection in the intestines that can cause diarrhea, which may be bloody, with severe infections causing hemolytic uremic syndrome (HUS), which can cause serious illness and death. The strain most prevalent in the United States is more likely to cause HUS, especially among young children n. In 2019, two positive STEC cases from the same childcare facility prompted state NDHHS investigators to interview employees of the facility and parents and guardians of children attending the facility. Employees who had experienced recent gastrointestinal symptoms were excluded from child interaction until testing negative for STEC on two consecutive stool samples. In all, two serotypes of STEC were found among child attendees. No employees tested positive, but 10 child attendees and one additional household contact tested positive for the strain that can cause HUS. Testing indicated that all cases were genetically similar within the serotype clusters. The outbreak infected 16 total individuals. This disease spreads easily and has a low infectious dose (NDHHS, 2019). Nationally, STEC results in about 3,600 hospitalizations and 30 deaths a year.

Legionnaires' Disease is caused from the Legionella bacteria, which thrives in wet environments. In January 2019, NDHHS received notification of two confirmed Legionnaires' diagnoses. Investigators discovered that both infected individuals had spent time at a hotel water park in Cass County shortly before their diagnosis. Further investigation linked a third case to the same water park, and sampling confirmed that the whirlpool spa had Legionella present. The spa was closed and disinfected (NDHHS, 2022). Water tests were conducted, and the spa re-opened after tests were negative for the bacteria. A

news release was issued to help identify any other possible infections. Testing was continued for six months to assure there was no return.

Multi-drug resistant organisms (MDRO) are fungi and bacteria that are resistant to antibiotics. The CDC began categorizing MDROs in 2013 and, by 2019, released updated information describing a growing list of MDROs and the possibility of community transmission of these infections. The first such organism was identified in North Dakota in 2016, and only one novel organism had been identified until 2018 (NDHHS, 2023). Between 2018-2022, 54 novel organisms were identified including a pan-resistant organism in 2022, which means the treatment options are limited.

In 2022, a global Mpox (formerly monkeypox) outbreak included six cases in North Dakota. Each infected individual had self-identified as having risk factors associated with contracting the disease. Two were treated with the TPOXX antiviral treatments which was coordinated through the NDHHS Emergency Preparedness and Response Section and Disease Control Section in addition to treatment by their medical providers. Close contacts were identified, monitored for symptoms, and offered post-exposure antiviral treatments. The NDHHS laboratory is the sole provider of Mpox tests in the state. As of April 2023, 89 samples had been processed. NDHHS worked with healthcare providers to offer pre- and post-exposure vaccinations for the infectious disease. It is a two-dose vaccine (Pinnick, 2023). As of April 2023, 452 first doses and 306 second doses had been administered.

4.7.1.2.3 Animal Disease

The following are descriptions of notable or recent occurrences of animal disease in North Dakota.

In 2022, highly pathogenic avian influenza was confirmed in 307 wild birds in North Dakota. In North Dakota, 17 counties, 24 flocks, and at least 295,000 poultry were affected. Nationally, the outbreak included 47 states and more than 50 million birds (North Dakota Board of Animal Health, 2023). Over 70 percent of the cases impacted turkey flocks, which are still recovering. New influenza viruses continue to threaten poultry livestock with the potential to infect humans and other animal species.

Swine Flu, or Influenza A, can be passed among pigs and humans. Pigs in Mexico were the origins of the 2009-10 human pandemic of swine flu. Hygiene, farm design, and vaccinations of humans and pigs can reduce the risk of future outbreaks (Vincent, et al, 2018). Since the 2009-10 outbreak, swine flu has continued to circulate in the human and pig population, and the H1N1 variant appears to have been prevalent in pigs since the human influenza outbreak in 1918 and may have derived from the original human strain before jumping to birds to become avian influenza (The Center for Food Security and Public Health, 2022). This interplay demonstrates the risk of viruses mutating to become better established in new animal hosts, and the risk to humans for a future outbreak caused by zoonotic viruses.

Due to the high numbers of livestock in the county, veterinary services can also become overwhelmed in the case of an outbreak in farm animals and livestock. The onset of stress to veterinarian and medical facilities can occur quickly with limited personnel and resources in rural areas such as Dickey County.

(Dickey County Multi-Jurisdictional Hazard Mitigation Plan, 2019)

Brucellosis is a bacterial disease that can infect livestock, domestic animals, and humans. It leads to spontaneous abortions, pain, fatigue, swelling, and reduced fertility (USDA APHIS, 2023).

Since August 2020, the United States has been designated Class Free of Swine and Bovine Brucellosis, a designation that indicates no presence of the disease in the past 12 months in the nation's livestock (USDA APHIS, 2023). This disease is still present in the greater Yellowstone area wildlife but not in area livestock.

4.7.1.2.4 Plant Disease and Pest Infestations

The following are descriptions of notable or recent occurrences of plant disease in North Dakota.

Cyanobacteria is a blue-green harmful algae bloom that produces toxin that can make humans and animals sick. While not a plant disease it is a plant that causes illness in humans and animals. **Figure 4.7-8** shows a cyanobacteria bloom in Blacktail Dam Lake in Williams County, in June 2023. Cyanobacteria has become more prevalent in recent years, creating the need for a water advisory system from the North Dakota Department of Environmental Quality (NDDEQ, 2023). While Cyanobacteria thrives in drought conditions, even in non-drought years, cyanobacteria cause advisories and warnings from the DEQ. The last week of July 2023 had 12 active advisories on water bodies in 12 different counties. Advisories encourage people to stay out of the water, avoid swallowing or letting pets swallow water in the water body, and encourage rinsing off if exposed to the water.

Figure 4.7-8: Cyanobacteria bloom in Blacktail Dam Lake in Williams County

Source: NDDEQ, 2023

> Unfortunately, green ash trees typical of North Dakota forests are susceptible to the [Emerald Ash Borer]. Green ash is North Dakota's most dominant tree and extremely important forest resource. Wildlife species that are dependent on healthy forests would also be indirectly impacted.
>
> *(Burke-Divide Counties Multi-Jurisdictional Hazard Mitigation Plan, 2019)*

Grasshoppers are becoming a more common menace to North Dakota farmers and outdoor recreationalists. Reports from NDSU indicate that the percentage of fields reporting grasshoppers increased from 28 percent in 2017 to 65 percent in 2021. Nymph through adult grasshoppers typically begin feeding heavily from July into August, eating whatever crops or grasses they come upon (NDSU Extension, 2021). Their annual presence in North Dakota has prompted an art installation near Regent called "Grasshoppers in the Field", built in 1999 from oilfield scrap material by Gary Greff, shown in Figure 4.7-9.

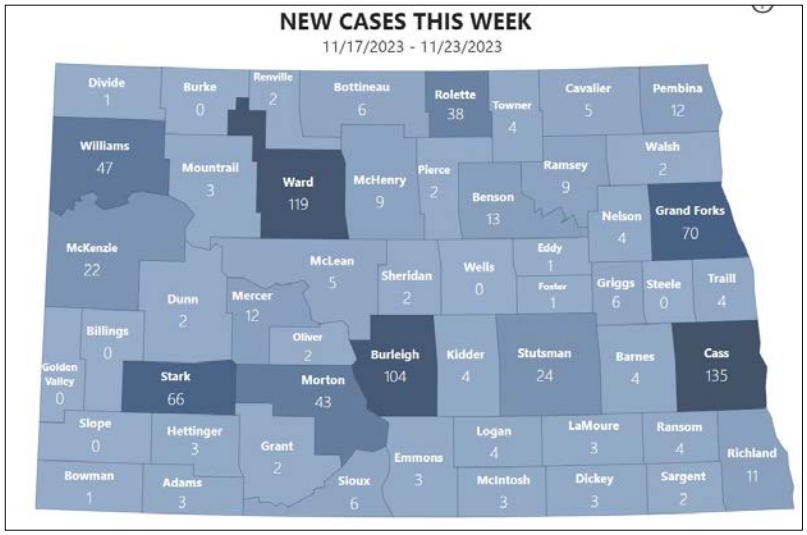
Figure 4.7-9: "Grasshoppers in The Field" by Gary Greff in Regent

Source: Skyvader, Wikimedia Commons, 2020. CC BY-SA 4.0

4.7.1.3 Location and Extent

Infectious diseases can occur anywhere. Wherever there is an infected source able to pass it on to a human or animal, all humans in North Dakota can be infected, no matter where they may live. However, congregate settings can facilitate the transmission of infectious diseases more easily. Just because the national emergency is ended or flu is out of season, does not mean that these diseases do not continue to spread among the population. Despite a May 2023 end to the COVID-19 national emergency, meaning there is no longer a need to mobilize federal resources to fight the disease, members of the public continue to contract the disease. For those unvaccinated, immune compromised or having other co-morbidities or health inequities, serious illness and death continue to be consequences of the disease. **Figure 4.7-10** is a map showing the 831 new cases in North Dakota for the week of November 17, 2023. In the same week, there were 49 hospitalizations in the state for COVID-19. Cases were geographically dispersed

Figure 4.7-10: COVID-19 New Cases for Week of November 17, 2023



Source: North Dakota Department of Health and Human Services, 2023

with the data serving essentially as a population proxy with the largest communities generally having the most cases and cases relatively proportional to population.

Figure 4.7-11 shows the top counties by cumulative COVID-19 cases as of April 2023, the population, and the rate per capita of infection. The state average for infections per capita is 0.33. Rolette and Sioux Counties have the highest infections per capital rate with Rolette County's rate (0.67) double the state average. Sioux County had the second highest rate (0.44) in the state.

Figure 4.7-12 shows the cumulative COVID-19 cases. With Burleigh County and Cass County with the most cumulative cases between (40,001 – 71,957). These counties' populations are larger than average suggesting more population at risk.

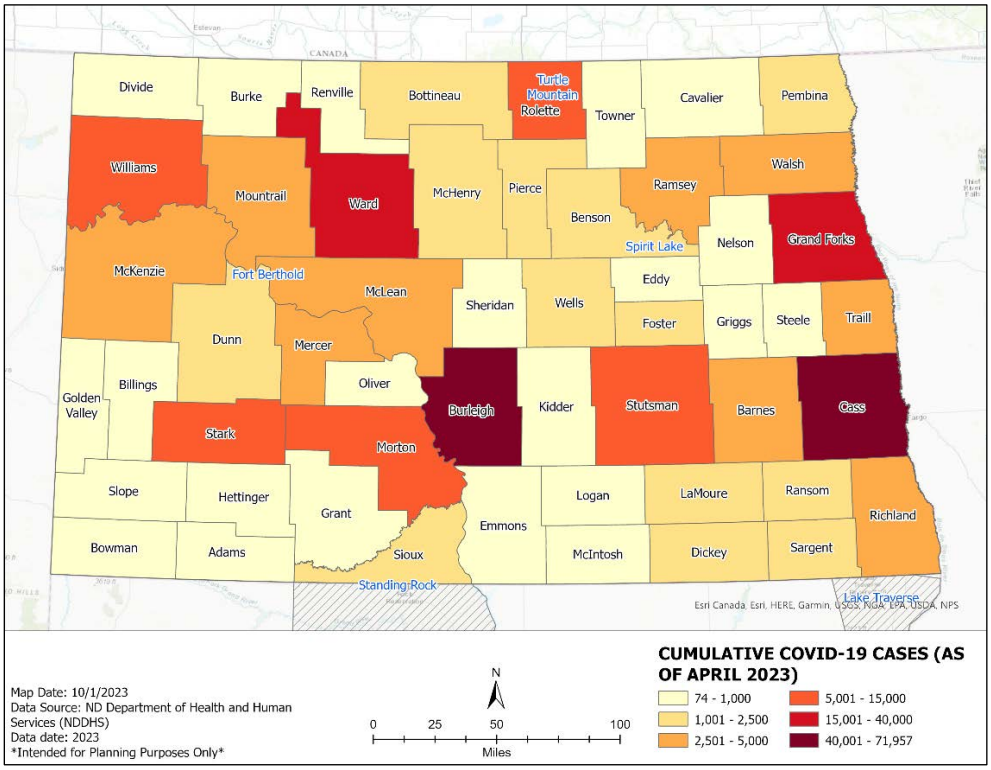
Figure 4.7-14 shows vaccination rates for COVID-19 by county as of July 2023. Given the rate of infection and the historical consequences for Native Americans in the state that, historically, did not have access to federal vaccination programs, Rolette County has the highest rate (78.0 percent) of population vaccinated against COVID-19. Western North Dakota counties generally have a lower rate of COVID-19 vaccination than other parts of the state, with McKenzie (33.5 percent) and Williams (33.6 percent) having the lowest rates. Emmons (39.5 percent) and Kidder (41.3 percent) are the only counties east of the Missouri River in the bottom 10 and Sioux (63.8 percent) is the only county in the top 10 west of the Missouri River (NDHHS, 2023). North Dakota is one of 17 states that allow people to opt out for religious, moral, or philosophical reasons.

Figure 4.7-11: Top Counties for COVID-19 Infections as of April 2023

County	Covid Cases	Population	Infections Per Capita
Cass	71,957	184,525	0.39
Burleigh	41,598	98,458	0.42
Grand Forks	27,361	73,170	0.37
Ward	24,378	69,919	0.35
Stark	13,952	33,646	0.41
Morton	13,409	33,291	0.40
Williams	12,400	40,950	0.30
Stutsman	8,387	21,593	0.39
Rolette	8,204	12,187	0.67
Richland	4,856	16,529	0.29
Ramsey	4,434	11,605	0.38
Walsh	4,169	10,563	0.39
Mountrail	3,961	9,809	0.40
Barnes	3,743	10,853	0.34
McKenzie	3,676	14,704	0.25
McLean	3,217	9,771	0.33
Mercer	3,053	8,350	0.37
Traill	2,541	7,997	0.32
Pembina	2,428	6,844	0.35
Benson	2,309	5,964	0.39
Ransom	1,959	5,703	0.34
Bottineau	1,907	6,379	0.30
Dickey	1,832	4,999	0.37
Sioux	1,709	3,898	0.44

Source: North Dakota Department of Health and Human Services, 2023; Census, 2020

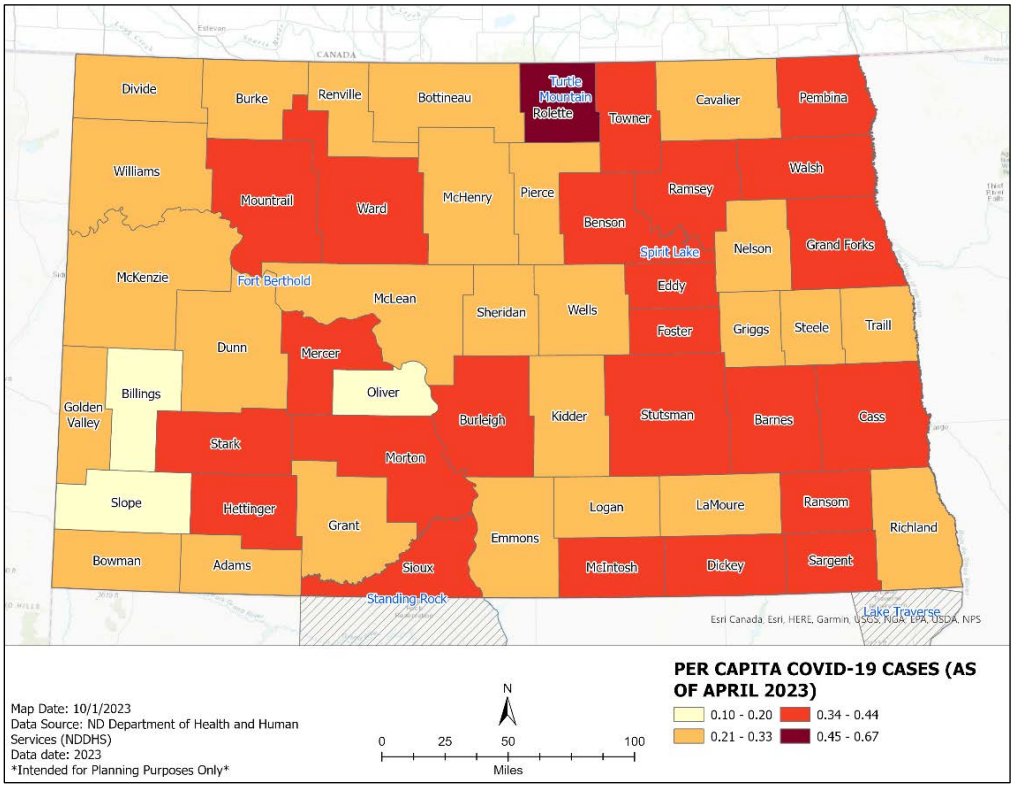
Figure 4.7-12: Cumulative COVID-19 Cases as of April 2023 by County



Source: North Dakota Department of Health and Human Services, 2023

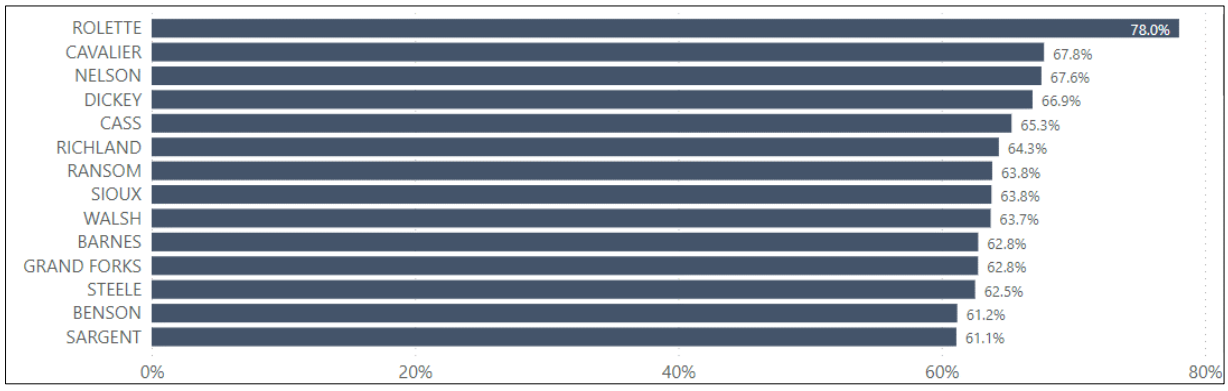
COVID-19 had an unforgettable impact on the globe including all of North Dakota. With 15,993 Cases at its peak the pandemic had an incredible impact on assets and its people (NDHHS, 2023). Participants in many of the state Enhanced Mitigation MAOP outreach sessions mentioned experiences within the last five years that had changed their lives forever from isolation, changing the way that technology functioned, and death of family members and friends. These experiences highlight the need for infectious disease mitigation, control, and surveillance.

Figure 4.7-13: Per Capita COVID-19 Cases as of April 2023 by County



Source: North Dakota Department of Health and Human Services, 2023

Figure 4.7-14: Top COVID-19 vaccination rates by percentage of population as of July 13, 2023

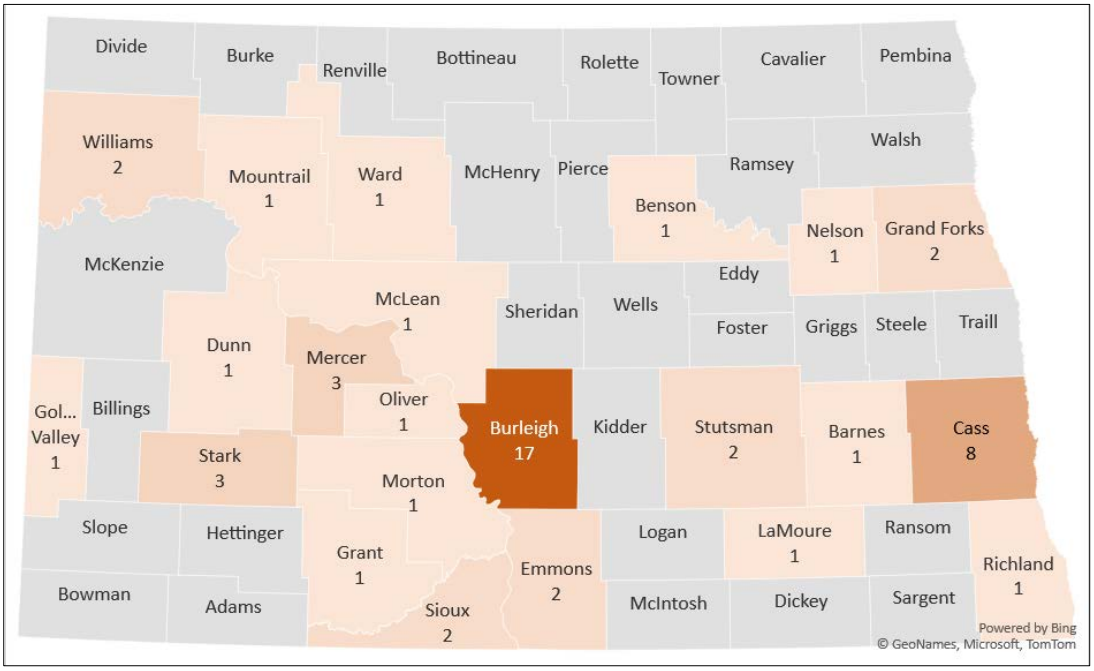


Source: North Dakota Department of Health and Human Services, 2023

The state's more recent outbreaks of mumps have occurred in the western counties of Ward, Stark, and Williams. It has not been found whether the viruses and bacteria which cause the infections prefer either the climate or the geography of these western counties. Social factors are more likely to explain why one part of the state experiences an outbreak over others (Fargo Forum, 2016; Jean, 2019). These western counties each had COVID-19 rates higher than the state average and COVID-19 vaccination rates lower than the state average, which may indicate low vaccination rates as a general cause. Public gatherings and/or activities and workplaces that bring an infected person in contact with others, can be drivers of an outbreak (Donahue, et al., 2020). Areas with large communal work sites and/or large social events, combined with lower levels of vaccinations, can create a more favorable environment for communicable diseases to spread.

MDROs have been diagnosed in 22 counties in North Dakota since the last plan update as shown in **Figure 4.7-15**. While there are generally more cases in urban areas, the distribution of the 54 cases is not an approximation of population, with cases appearing in rural counties and Burleigh County (Bismarck) having more than twice the cases of Cass County (Fargo).

Figure 4.7-15: Novel Cases of MDROs in ND, 2018-2022

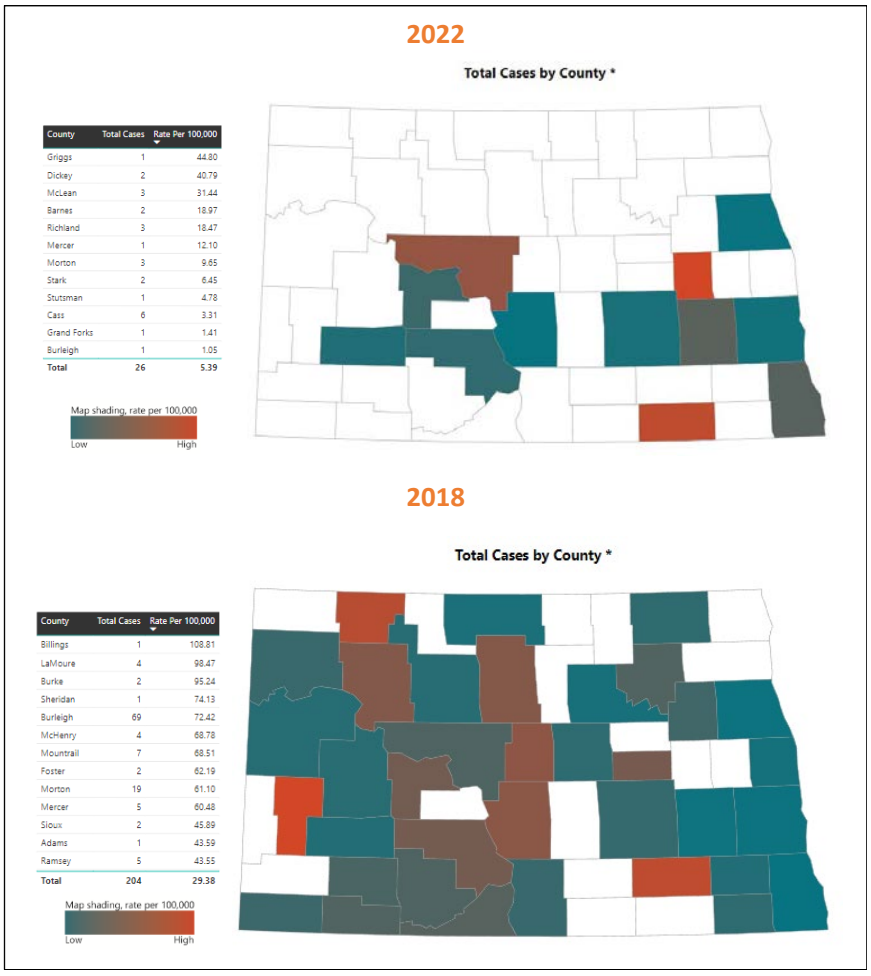


Source: North Dakota Department of Health and Human Services, 2023

West Nile virus is spread by and can infect humans and animals. Most infected people do not exhibit symptoms, but about 1 in 150 will develop neurological symptoms that can be fatal.

Figure 4.7-16 shows the distribution of the 26 human cases in 2022 by county in North Dakota. Cass County had the most cases (6), but its high population made the rate relatively low. The rural counties of Griggs, Dickey and McLean had the highest rate of infection. Griggs also had the highest rate in 2021, but had no cases in 2020, 2019 or 2018 (NDHHS, 2023). The 2018 West Nile season was the busiest in the plan update period with 204 cases. The central portion of the state was hit relatively hard that year with 69 cases in Burleigh and high rates in many of the Missouri River border counties.

Figure 4.7-16: West Nile Virus Cases by County, 2022 and 2018



Source: North Dakota Department of Health and Human Services, 2023

Figure 4.7-17: Animal West Nile Virus Cases, 2021-22

	Birds Infected	Mammals Infected
Grand Forks and Cass County	**3**	**5**

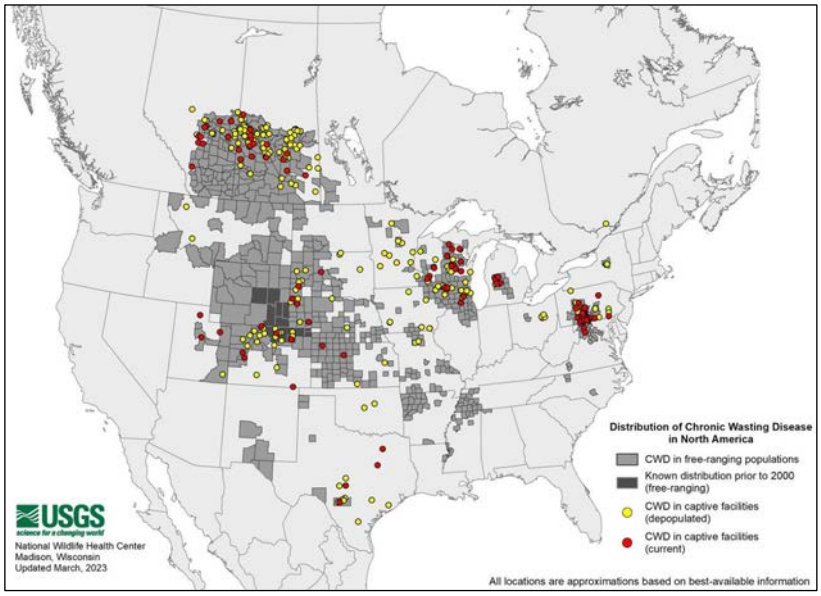
Source: North Dakota Board of Animal Health, 2023

Figure 4.7-17 shows the distribution of animal West Nile Virus cases across the 2021 and 2022 seasons. All cases were encountered in Grand Forks and Cass Counties.

Disease detected in wild game include CWD and EHD. Chronic wasting disease is a fatal prion disease found in deer, elk, and similar animals. Symptoms can take more than a year to develop, and include weight loss, imbalance, and other neurologic symptoms. While prion disease exists in humans, no cases of human prion diseases attributed to CWD exposure have been documented. Since 1997, the CDC and

WHO recommend keeping infected meat out of the food chain due to its likelihood for crossing species in the future (CDC, 2021). The National Wildlife Health Center (NWHC) of the United State Geological Survey tracks cases of CWD, and the spatial extent of the disease is shown in **Figure 4.7-18** (NWHC, 2021). North Dakota has yet to experience a case of CWD in captive populations, but the neighboring states of Montana, Minnesota, and South Dakota as well as neighboring Canadian provinces of Alberta and Saskatchewan reported cases in captive herds. CWD has been detected in free ranging deer in 10 western and northern North Dakota counties as of 2023.

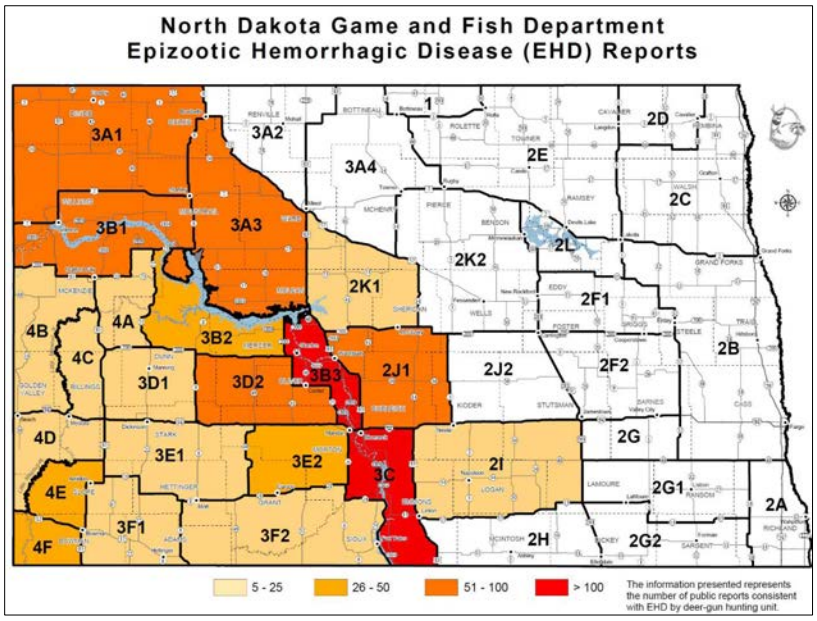
Figure 4.7-18: Continental Spatial Extent of Chronic Wasting Disease, March 2023



Source: USGS, NWHC, 2021

Epizootic Hemorrhagic Disease (EHD) is a virus transmitted by midge bites. In white-tailed deer, the disease is often fatal. **Figure 4.7-19** shows the geographic distribution of EHD reports to North Dakota Game and Fish (NDGF) in 2021. Humans are not considered to be susceptible to infection with the virus so the risk from contacting, handling, or consuming meat of infected animal are considered minimal.

Figure 4.7-19: Epizootic Hemorrhagic Disease Reports in ND, 2021



Source: North Dakota Game and Fish, 2021

However, other livestock can be affected and may die (NDGF, 2021). Hard frosts typically kill off the midges that spread the disease, stopping the spread. The extent of the disease can be localized or more regional, as it was in 2020 and 2021, prompting the North Dakota Fish & Game Department to offer refunds for deer permits in affected areas. North Dakotans are encouraged to report sick or dead deer.

Figure 4.7-20 shows the confirmed EHD cases in captive animals by county and species in 2021-2022 as reported to the North Dakota Board of Animal Health. Burleigh (5) and McLean (4) counties have had the most confirmed cases. Burleigh, Emmons, Kidder, McKenzie, Morton, Oliver, and Sioux counties each reported at least one case of confirmed EHD in cattle.

Figure 4.7-20: Epizootic Hemorrhagic Disease Confirmed Cases 2021-22

County	Bison	Cattle	Elk	Goat	Whitetail	Total
Burleigh		3	1		1	5
Dunn			1			1
Emmons		2				2
Kidder		1				1
McKenzie		1				1
McLean	1		1		2	4
Mercer	1		1			2
Morton		1				1
Oliver		1				1
Sioux		1				1
Williams			1	1		2

Source: North Dakota Board of Animal Health, 2023

Anthrax is a naturally occurring organism that is resistant to natural conditions but can be destroyed easily through disinfection or pasteurization. Anthrax spores in nature can live for up to five years on surface soil, and for generations in deeper soil. Grazing animals are exposed to anthrax if it is in the soil, and herbivores, including cattle, bison, and sheep, are particularly susceptible. An infected carcass can put many more animals at risk for disease. Infected carcasses must be cremated or buried deeply in the soil to stop the spread of the disease. Flooding can spread infected soils to new pastures. Vaccinations can reduce infections and are recommended for any cattle grazing on a pasture with a known anthrax case in the past 10 years. Mosquitoes and other blood-sucking insects can also spread anthrax. Animal anthrax is usually fatal with few symptoms, other than weakness and bleeding from orifices when death is imminent. Human infections are typically localized when infected by skin, but respiratory anthrax can start with flu symptoms and quickly progress to death. Ingested anthrax is not common in the developed world. It can be treated with penicillin if caught early (Stoltenow, 2021).

Anthrax is considered endemic in the state, but it is endemic below the surface, and areas with erosion are the most susceptible to disease (Mongoh et al, 2007). **Figure 4.7-21** is a table that lists the 11 counties where the 18 cases of animal anthrax were identified in the state between 2006 and 2022. These cases came from all areas of the state.

Figure 4.7-21: Counties with Animal Anthrax Cases 2006-2022

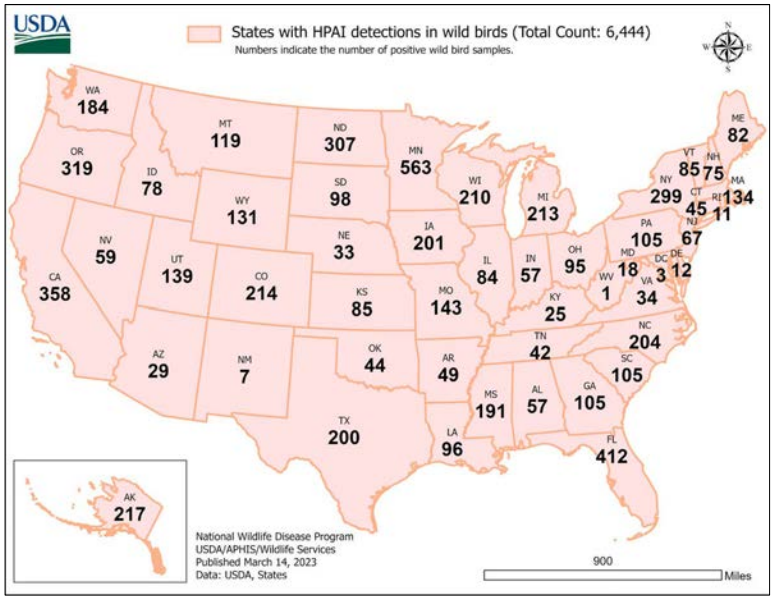
Counties with Anthrax Cases, 2006-2022 (18 total)		
Barnes	Emmons	Morton
Billings	Grand Forks	Pembina
Burleigh	Hettinger	Sioux
Dickey	Kidder	

Source: North Dakota Board of Animal Health, 2023

Highly Pathogenic Avian Influenza (HPAI) is highly contagious and usually fatal to poultry. It is distinct from seasonal human influenza and transmission to humans is rare. However, both the Asian H7N9 and Asian H5N1 strains of avian flu have infected humans. H7N9 has caused six epidemics in China, with a 39 percent mortality rate in infected humans in the first five epidemics, but there have been just three reported infections since October 2017. H5N1 has infected humans working with birds in other countries, beginning in Hong Kong in 1997.

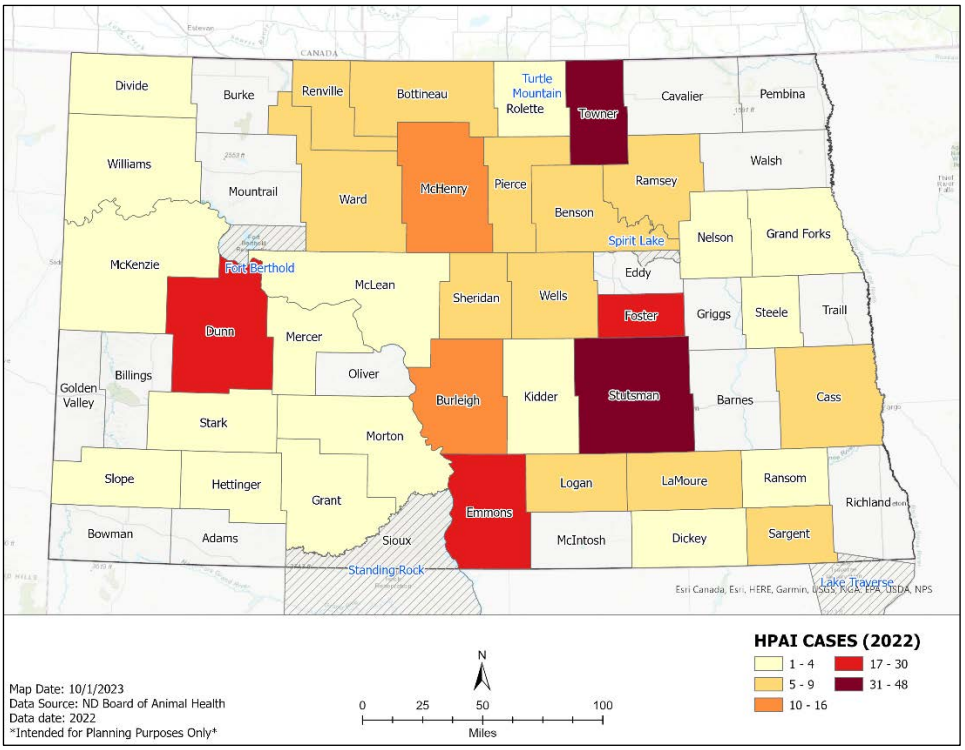
It is considered endemic in Bangladesh, China, Egypt, India, Indonesia, and Vietnam (CDC, 2022). The only human avian flu case occurred in a traveler to Canada from Asia, and the strains that have been responsible for human infections have not been found circulating in the United States. However, as of March 2023, the outbreak of HPAI in the United States and in North Dakota is ongoing. **Figure 4.7-22** shows the geographic distribution of HPAI detections in wild birds in the nation as of March 2023. North Dakota ranks fourth highest, with neighboring Minnesota having the most confirmed detections (USDA APHIS, 2023). **Figure 4.7-23** shows the HPAI detections in wild birds by county in North Dakota (North Dakota Board of Animal Health, 2023). Of the numerous counties where HPAI was detected in wild birds in 2022, the most occurred in Stutsman (48) and Towner (42).

Figure 4.7-22: HPAI in the United States, 2022



Source: USDA APHIS, 2023

Figure 4.7-23: HPAI Cases in Wild Birds by County, 2022



Source: North Dakota Board of Animal Health, 2023

Figure 4.7-24 and **Figure 4.7-25** provide an overview of the HPAI cases in North Dakota in commercial and domestic flocks.

Figure 4.7-24 shows how cases were divided among commercial and backyard flocks and among chickens and turkeys. Backyard flocks were almost four times as likely to have an HPAI case than commercial flocks.

Figure 4.7-25 shows the distribution of cases by county, and while there were cases of HPAI across the state, there was a distinct cluster in Southeastern counties (North Dakota Board of Animal Health, 2023). In the same year, there were two cases in the state of red foxes developing HPAI, one in Burleigh and one in Dickey.

The North Dakota Department of Environmental Quality tracks harmful algal blooms, including cyanobacteria. HABs impact waterbodies throughout the state during warm summer months. It posts warnings, advisories, low toxin levels, and reports under investigation on its website so that recreationalists and water authorities can make decisions (NDDEQ, 2023). **Figure 4.7-26** shows the advisories on July 25, 2023. It shows that all regions of the state are impacted.

Figure 4.7-24: HPAI Cases Flock Type, ND 2022

Flock Type	Cases
Backyard Chicken Flock	10
Backyard Mixed Flock	9
Commercial Turkey	2
Commercial Turkey/Chicken	3

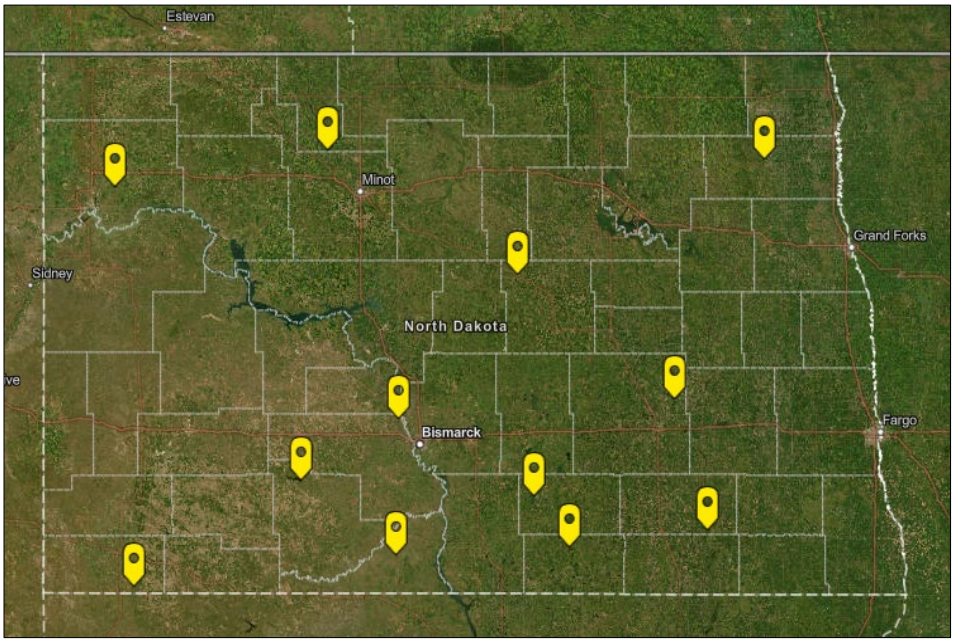
Source: North Dakota Board of Animal Health, 2023

Figure 4.7-25: HPAI Cases by County, ND 2022

County	Cases	County	Cases
LaMoure	3	**Kidder**	1
Cass	2	**McHenry**	1
Dickey	2	**Mountrail**	1
Richland	2	**Nelson**	1
Stutsman	2	**Ransom**	1
Ward	2	**Renville**	1
Barnes	1	**Sheridan**	1
Bottineau	1	**Traill**	1
Burke	1		
Subtotal	16	*Subtotal*	8
Grand Total	**24**		

Source: North Dakota Board of Animal Health, 2023

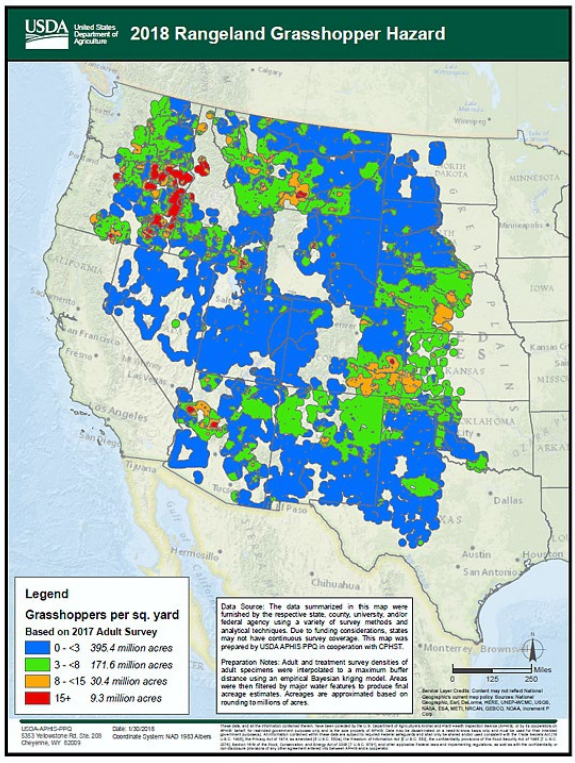
Figure 4.7-26: NDDEQ Harmful Algal Bloom Advisories for July 25, 2023

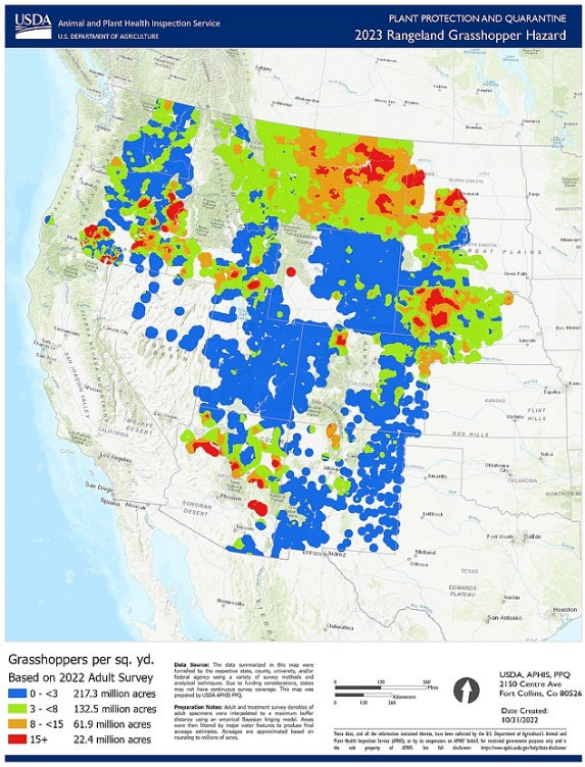


Source: North Dakota Department of Environmental Quality, 2023

USDA APHIS also tracks and forecasts grasshopper infestations for the nation. Grasshoppers are a major pest east of the Sierra Madre and Cascade Mountain Ranges and across the Great Plains. Grasshopper infestations have increased in the state recently. **Figure 4.7-27** shows the forecast maps for grasshoppers in 2018, at the beginning of the plan update period, and the forecast for 2023 (USDA APHIS, 2018-2023). Grasshopper forecasts for 2018 to 2022 forecast a rate of less than 3 grasshoppers per square yard. In 2023, much of the area west of the Missouri River is forecast to have a grasshopper infestation, and the area forecast for grasshoppers is expected to have a rate higher than 3 grasshoppers per square yard.

Figure 4.7-27: USDA APHIS Grasshopper Forecasts for 2018 and 2023

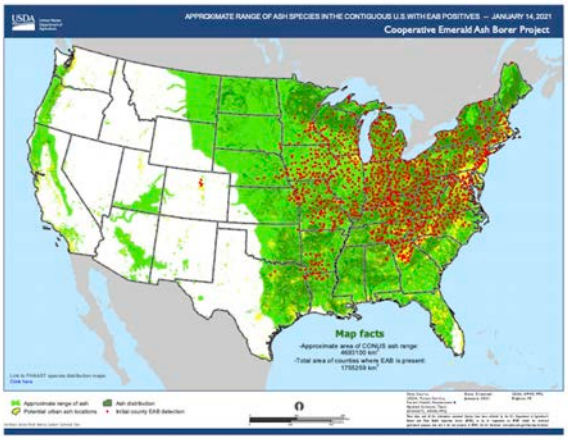




Source: USDA APHIS, 2023

North Dakota had yet to have a positive report for Emerald Ash Borers (EAB) as of March 2023, however, the ash trees on which they feed live throughout the state. National distribution of ash tree range and positive EAB cases until January 2021 are shown in **Figure 4.7-28**. In March of 2023, there was a positive case for EABs in Moorhead, Minnesota, across the river from Fargo, North Dakota (USDA, 2023; North Dakota Department of Agriculture, 2023). Given the progress of the invasive species over time, it is reasonable to anticipate that the state will be

Figure 4.7-28: Emerald Ash Borer Cases and Ash Range, 2021



Source: USDA APHIS, 2021

battling the insect for its tree canopy before the next plan update.

Figure 4.7-29 provides an overview of the spatial extent for infectious diseases and pest infestations.

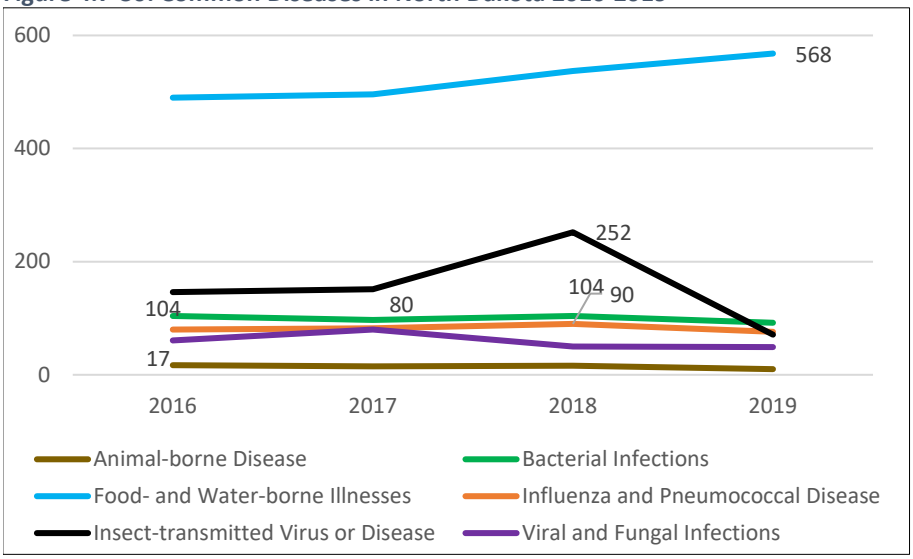
Figure 4.7-29: Spatial Extent for Infectious Diseases, Animal Diseases, and Pest Infestation

Resource	Extent
Public	Statewide
First Responders	Statewide
Delivery of Service and Continuity of Operations	Statewide
Property, Facilities, and Infrastructure	Statewide, but limited impact
Environment	Statewide
State Economy	Statewide with greater impacts in agriculture
Public Confidence in the State's Governance	Statewide

4.7.1.4 Probability

Infectious diseases continue to pose a significant threat with human diseases likely to have greater impacts on the North Dakota public. **Figure 4.7-30** shows the rate of all tracked diseases in North Dakota from 2016-2019 (CDC, 2023). In each year, food-and water-borne diseases had more than twice the cases of the next-highest category of diseases (Insect-transmitted). Food- and water-borne diseases also experienced the largest increase over the time period.

Figure 4.7-30: Common Diseases in North Dakota 2016-2019



Source: Centers for Disease Control and Prevention, 2023

COVID-19 rates were briefly discussed in the previous section, indicating a rate of about 1 in 3 North Dakotans contracting the disease during the emergency period (NDHHS, 2023).

Figure 4.7-31 looks specifically at the influenza cases, hospitalizations, and deaths in the state. The per capita influenza rate in North Dakota since 2016 is 1.08 percent of the population (NDHHS, 2023). Since 2018, there has been a slight increase to 1.10 percent of the population, despite an extremely low rate (0.03 percent) for 2020-2021 when COVID-19 precautions also reduced communication of other infectious diseases. Hospitalization went down slightly, and the death rate has increased slightly since 2018.

Figure 4.7-31: Influenza by the Numbers in North Dakota, 2016-23

Flu Season	Cases	Hospitalization	Deaths	
			Influenza	Pneumonia/Flu
2016-17	7,477	246	22	22
2017-18	8,530	313	30	520
2018-19	7,946	546	23	467
2019-20	12,502	420	21	482
2020-21	245	21	6	1,350
2021-22	10,610	204	23	1,141
2022-23	11,439	399	35	482

Source: North Dakota Department of Health and Human Services, 2023

Figure 4.7-32 shows the death rates per 100,000 for flu and pneumonia as reported by the Kaiser Family Foundation. Pneumonia was much more deadly than Influenza for North Dakotans (Kaiser Family Foundation, 2023).

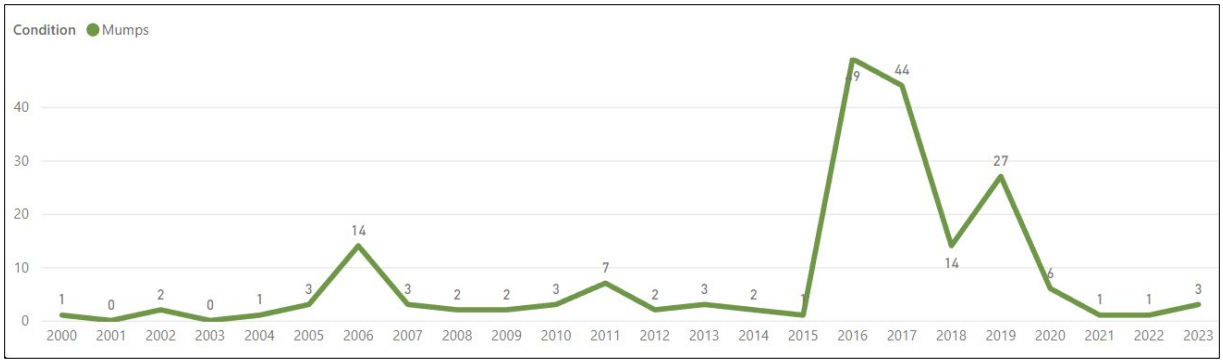
Figure 4.7-32: Influenza and Pneumonia Overview

Influenza and Pneumonia deaths per 100,000 Population, 2020	15.2
Influenza Deaths, 2020	2.6
Pneumonia Deaths, 2020	12.6

Source: Kaiser Family Foundation, 2023

Figure 4.7-33 shows the number of Mumps cases reported to the North Dakota Department of Health and Human Services since 2000. Cases surged from 2015 to 2019 before returning to the lower numbers that predominated in this century. Mumps, Measles, and Rubella vaccines are recommended as part of routine infant vaccinations, with some vaccinations required for school but North Dakota residents can exempt themselves from these requirements.

Figure 4.7-33: Mumps Cases in North Dakota since 2000

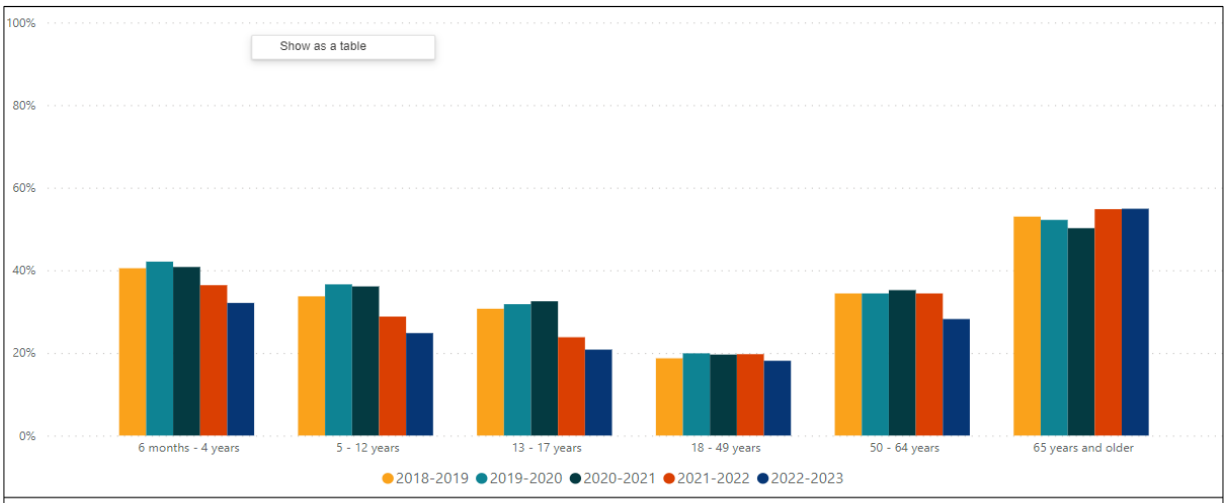


Source: North Dakota Department of Health and Human Services, 2023

Data demonstrates that community-wide social distancing and mask mandates were successful in reducing the number of communicable diseases in the state, and vaccines can reduce transmission or severity of the disease. The CDC recommends a flu vaccine for anyone six months and older (CDC, 2022).

Figure 4.7-34 shows the flu vaccine rate by age group in recent flu seasons. North Dakota lags the national vaccination rate that hovered in the mid-50 percents for adults during this period (CDC, 2022; NDHHS, 2023). Vaccination rates decreased in all age groups except the elderly during the plan update period.

Figure 4.7-34: North Dakota Influenza Vaccination by Age

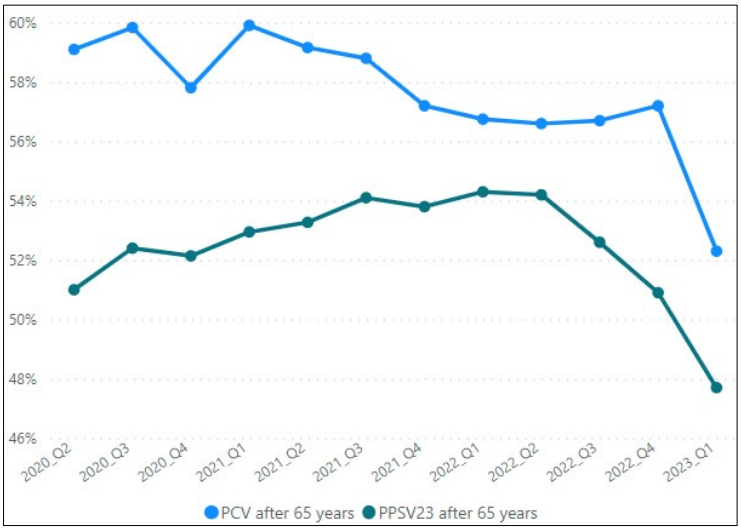


Percent of North Dakota residents in the selected age group who have received at least one dose of influenza vaccine for the indicated flu season

Source: North Dakota Department of Health and Human Services, 2023

Pneumonia can develop from a virus or bacteria and can develop as a secondary infection, for example, many influenza deaths occur when pneumonia develops as the illness progresses. Nationally, the pneumococcal vaccination rate for people under 65 was 22.2 percent, with a rate of 65.8 percent for those 65 and older (CDC, 2023). **Figure 4.7-35** shows the vaccination rates for the state of North Dakota for those 65 and older, with the state trailing the national figures by 5 or more percentage points.

Figure 4.7-35: North Dakota Pneumococcal Vaccination by Age



Source: North Dakota Department of Health and Human Services, 2023

Rates of infant vaccination for the pnuemococcal and the Measles-Mumps-Rubella 9 (MMR) vaccine for the state are shown in **Figure 4.7-36** (NDHHS, 2023). With a brief decrease in 2021, infant vaccination rates have returned to above 80 percent but are still lower than they were in 2020.

Lower-than-national-average, and generally decreasing rates of vaccination makes negative public health outcomes, illness, and death from communicable diseases more probable in the state.

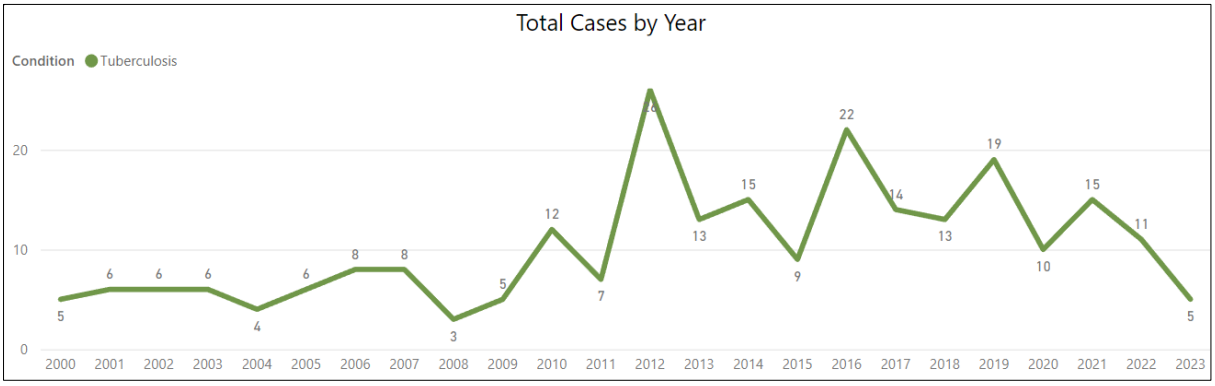
Figure 4.7-36: Infant Vaccination Rates in North Dakota

RATE_TYPE	4:3:1:3:3:1:4 Series		MMR	
Year_Qrt	Sum of RATE	First Year_Qrt	Sum of RATE	First Year_Qrt
2020_Q2	62.80%	2020_Q2	82.80%	2020_Q2
2020_Q3	62.10%	2020_Q3	81.40%	2020_Q3
2020_Q4	61.07%	2020_Q4	79.91%	2020_Q4
2021_Q1	60.99%	2021_Q1	79.13%	2021_Q1
2021_Q2	61.63%	2021_Q2	78.84%	2021_Q2
2021_Q3	62.10%	2021_Q3	78.40%	2021_Q3
2021_Q4	62.40%	2021_Q4	78.30%	2021_Q4
2022_Q1	65.40%	2022_Q1	81.40%	2022_Q1
2022_Q2	66.00%	2022_Q2	81.80%	2022_Q2
2022_Q3	65.90%	2022_Q3	81.50%	2022_Q3
2022_Q4	66.00%	2022_Q4	81.70%	2022_Q4
2023_Q1	65.00%	2023_Q1	81.00%	2023_Q1

Source: North Dakota Department of Health and Human Services, 2023

Tuberculosis (TB) is also a communicable disease that is spread through aerosolized droplets from an infected individual. While vaccines are available for tuberculosis and available to infants, they are uncommon in the United States due to the low rates of tuberculosis in the nation. While anyone can contract TB, it is more common among immigrants or travelers from countries with high rates of the disease and in people who live or work in congregate living facilities such as homeless shelters, jails, and nursing homes, where transmission is more difficult to control (CDC, 2009). **Figure 4.7-37** shows the TB cases in North Dakota since 2000. Cases have been elevated since a surge in 2010. In the previous decade there had not been more than eight cases reported to the state per year. Since 2010, only one year (2011) had less than eight cases, increasing the probability of TB cases impacting human health in the state (NDHHS, 2023). There has been drug-resistant strains of the disease found in the state as well. While most tuberculosis is treated with a four-drug regimen, the costs to treat drug-resistant TB are much higher (Kruger, VanderBusch, 2023). Multi-drug-resistant TB is a national security issue because of the difficulty in treating successfully. Since 2018, there have been 14 cases of drug-resistant TB with 3 cases per year except in 2022, when there were 2 cases, but one of those was multi-drug resistant.

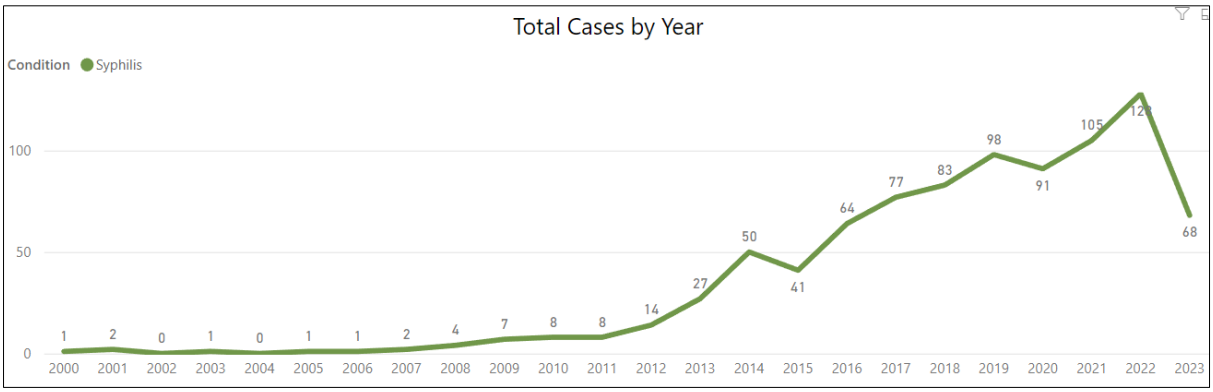
Figure 4.7-37: Tuberculosis Cases in North Dakota since 2000



Source: North Dakota Department of Health and Human Services, 2023

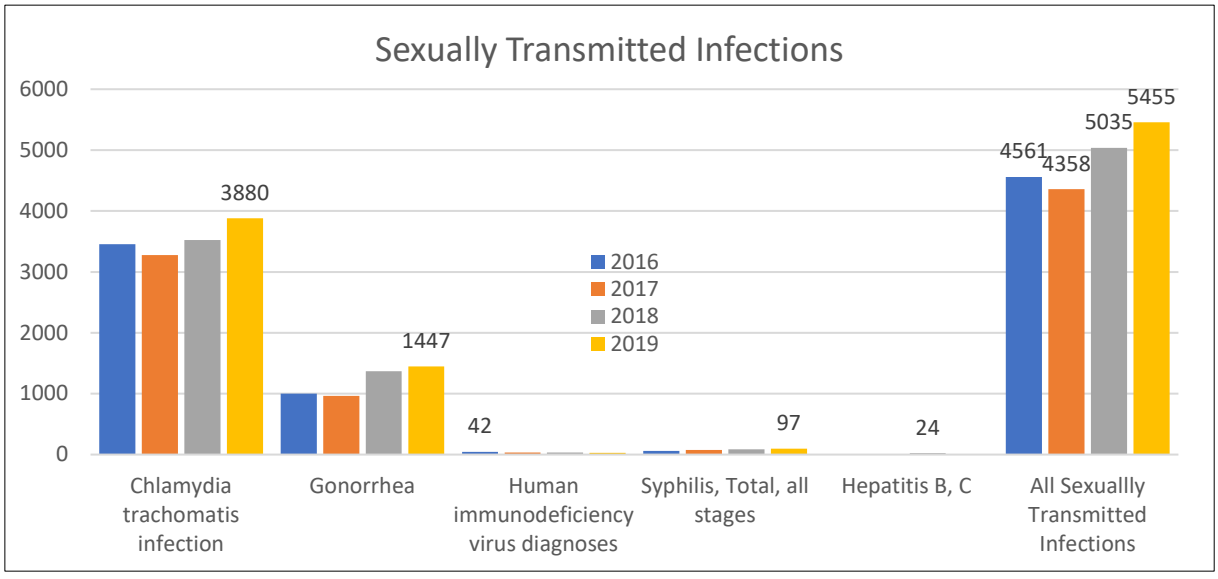
Sexually transmitted infections (STI) are not as contagious as communicable diseases that spread through droplet or airborne transmission. Sexually transmitted infections are transmitted through the exchange of body fluids through sexual contact or intravenous access with contaminated needles. Utilizing barrier methods of prevention and clean needles can reduce the spread of sexually transmitted infections. **Figure 4.7-38** shows the increasing number of syphilis cases in the state since a surge that began in 2012 (NDHHS, 2023). Adult cases of syphilis are growing in North Dakota, increasing more than 150 percent from 2016 to 2019, with a high of 127 cases in 2022 (NDHHS, 2023). All CDC tracked sexually transmitted infections except new HIV infections increased from 2016-2019, and HIV stayed essentially flat around 40 new cases each year, as shown in **Figure 4.7-39**. The increase in Chlamydia, Gonorrhea, Syphilis, and Hepatitis collectively increased STIs by about 1,000 new cases a year over the four-year period (CDC, 2023), leading to a slight increased probability of STIs since the last plan.

Figure 4.7-38: Syphilis Cases in North Dakota since 2000



Source: North Dakota Department of Health and Human Services, 2023

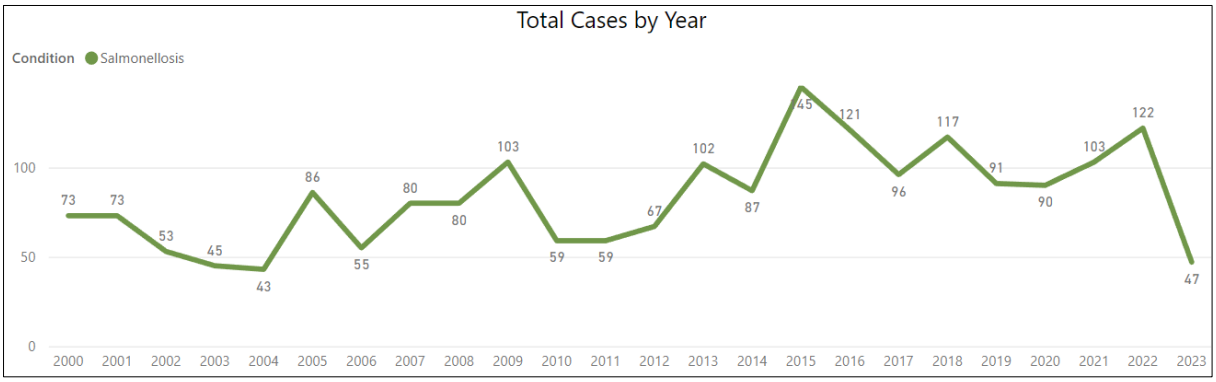
Figure 4.7-39: Sexually Transmitted Infections in North Dakota 2016-2019



Source: Centers for Disease Control and Prevention, 2023

Figure 4.7-40 looks at salmonellosis cases in the state since 2000. The average in the 23 years shown in the diagram is 88.6 cases per year (NDHHS, 2023). The average since 2018 has jumped to 104.6, increasing the probability in the state of contracting the illness.

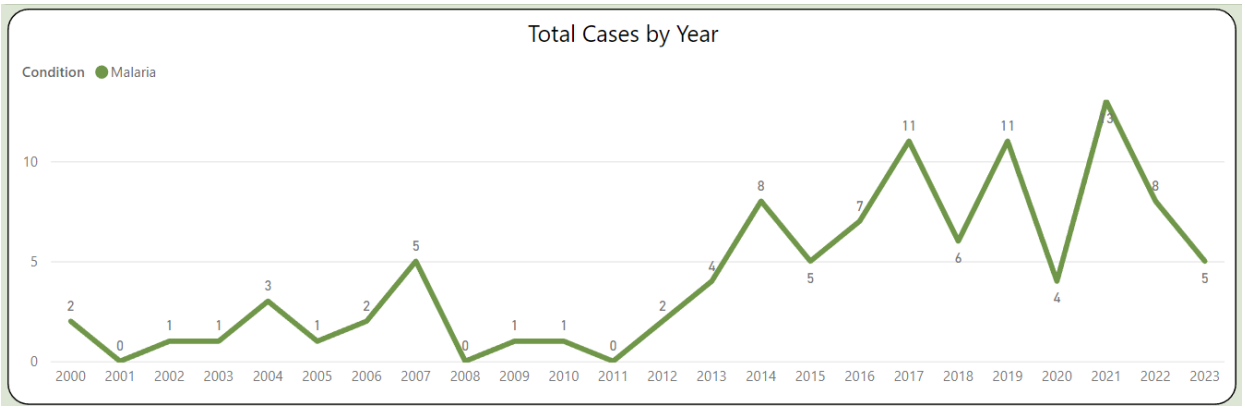
Figure 4.7-40: Salmonellosis Cases in North Dakota since 2000



Source: North Dakota Department of Health and Human Services, 2023

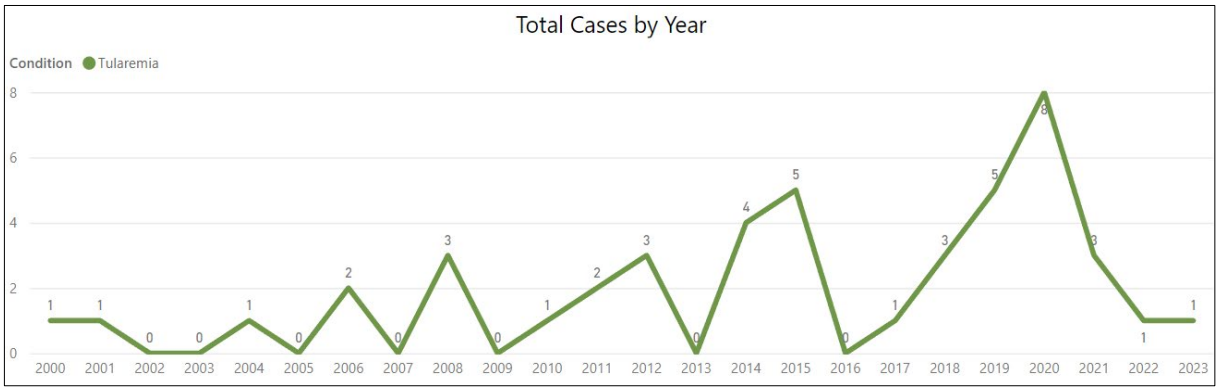
Figure 4.7-41 shows the cases of malaria, another disease common in other countries for which there are vaccines available, but not commonly administered to Americans not travelling overseas (NDHHS, 2023). Malaria cases in the United States typically occur in immigrants and travelers from other countries, but domestic cases have recently been identified in Texas, Florida, Maryland, and Arkansas in 2023. Prior to a surge that began in 2014, there had been no more than 5 cases in any of the previous 13 years, with an average number of 1.8 cases a year between 2000 and 2013. Since 2018, the state averaged 8.4 cases each year, increasing probability of malaria in North Dakota since the last plan update.

Figure 4.7-41: Malaria Cases in North Dakota since 2000



Source: North Dakota Department of Health and Human Services, 2023

Figure 4.7-42: Tularemia Cases in North Dakota since 2000



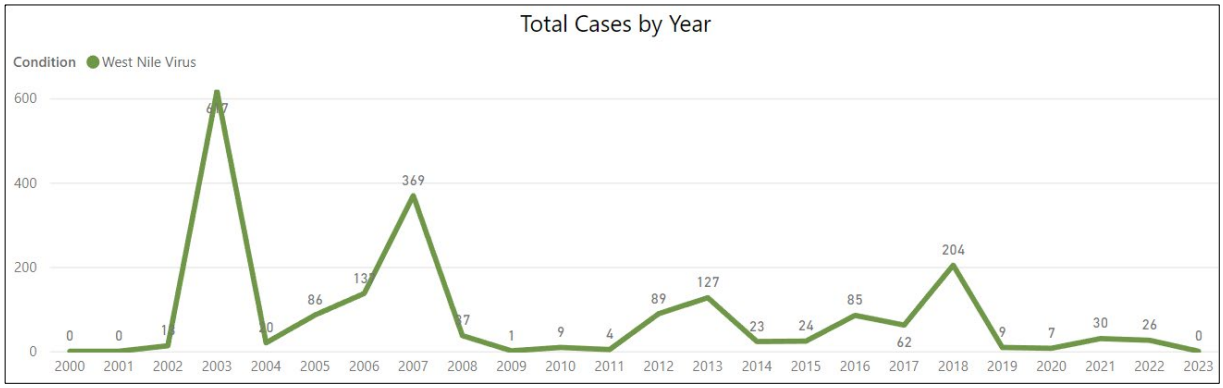
Source: North Dakota Department of Health and Human Services, 2023

Another vector-transmitted disease experiencing an increase in probability of infection in the state is Tularemia, as shown in **Figure 4.7-42**. With longer warm seasons, and the associated longer tick seasons comes an increase in opportunity for the insects to transmit the disease to humans. The 22-year average number of cases in North Dakota is 1.9 since 2000, but it more than doubles to 4.0 since 2018.

Figure 4.7-13 (earlier) looked at the proliferation of MDROs since the last plan, moving from one identified MDRO in the last plan update to at least 54 identified in the state by 2023, increasing the probability of these infections in North Dakota (NDHHS, 2023). MDROs are not the only emerging threats with increased probability in the state. Mpox was not known to circulate in the United States during the last plan update.

West Nile virus (WNV) and Lyme disease, both diseases spread by arthropod bites, with ticks associated with Lyme disease while mosquitos are associated with WNV. Both arthropods were both rare in the state when they began to be tracked by the state 23 years ago, but now pose a real risk to the public. **Figure 4.7-43** shows the WNV cases in the state since 2000. There have been four years with more than 100 cases of WNV in a year (2003, 2007, 2013, and 2018). This represents a small outbreak at an average of every five years, or a probability of an outbreak during the plan update period (NDHHS, 2023).

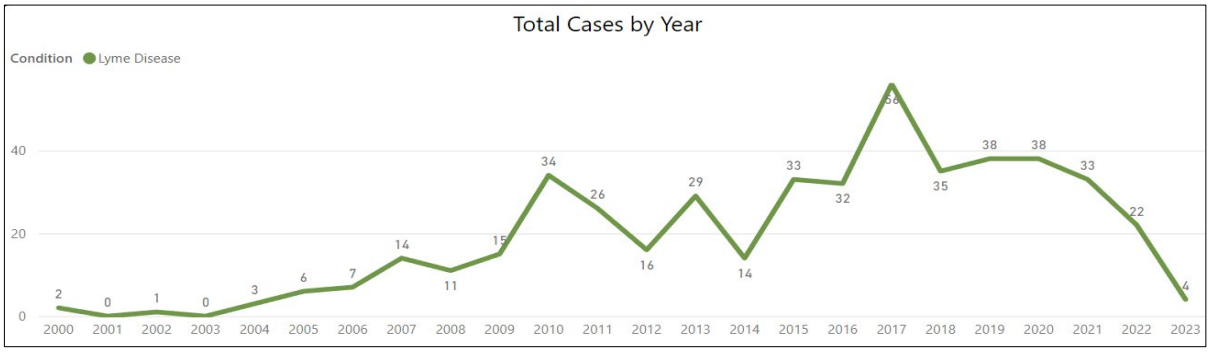
Figure 4.7-43: West Nile Virus Cases in North Dakota since 2000



Source: North Dakota Department of Health and Human Services, 2023

Lyme Disease had been on a mostly steady upward trend since 2000, but peaked in 2017 with 56 cases, as shown in **Figure 4.7-44**. The previous plan update period included a peak with a 32.8 average number of Lyme Disease cases between 2017 and 2022. Despite reductions in cases since the peak, the 2018-2022 data indicated that probability had increased slightly to 33.2 cases per year (NDDHS, 2023).

Figure 4.7-44: Lyme Disease Cases in North Dakota since 2000



Source: North Dakota Department of Health and Human Services, 2023

The presence of animal diseases remains relatively low in the state across diseases and animals impacted. While game-impacting diseases of CWD and EHD may be increasing in the state, its risk to people and even livestock, remains low. There have been just 18 Anthrax cases in livestock since 2006, that year representing the first year in a period with significantly reduced cases in the state and reduced probability of occurrence. Drivers of the presence of anthrax in the state are disruptions to the soil surface that exposes buried spores, so while in a lull, heavy floods or extremely strong precipitation events could uncover new spores and ignite an outbreak (Infectious Disease Committee, 2023). Equine infectious anemia cases are still extremely low, with the 2021-2022 testing period resulting in 2 trace positives, 3 false positives and no confirmed cases. Brucellosis has been eradicated in the nation since 2020. Although there have been no cases of swine hemorrhagic fever in the United States, it is present in most of the world, and the USDA monitors incoming swine for the disease. Its spread worldwide provides a constant threat of American exposure as do other livestock diseases more prevalent elsewhere (USDA, 2021). Surveillance and inspections have been successful in controlling the spread of many of the largest threats to livestock in the state, decreasing the probability of negative consequences from this hazard.

HPAI is perhaps the largest exception. Cases in wild and domestic birds have experienced significant national outbreaks in 2015 and 2022. The pathways for infection differed in the outbreaks. The 2015 event began in the Pacific Flyway for migratory birds, but after moving into farms was driven primarily by farm-to-farm transmission, spreading as far east as Indiana. The 2022 outbreak began in the Atlantic Flyway and continued with transmission primarily from wild birds to domestic flocks spreading all the way to Alaska. This meant that cases were more concentrated with high rates of transmission in fewer counties during the 2015 outbreak than the 2022 outbreak which spread to a wider geography but without concentrated impacts. North Dakotas central location in the continent meant that it was impacted by both outbreaks, and most of the areas impacted by both outbreaks occurred in North Dakota or neighboring states. **Figure 4.7-45** shows the range of wild birds identified as having HPAI in North Dakota during the 2022 outbreak. There were 31 different types of wild birds impacted in the state. (USDA APHIS, 2023). The multiple pathways of transmission from a wide variety of wild birds, central location, and rural economy increase the probability that future national outbreaks will continue to impact North Dakota.

Figure 4.7-45: Wild Bird HPAI Cases in North Dakota, 2022

Bird Type	Cases
American crow	19
American green-winged teal	6
American kestrel	1
American robin	1
American white pelican	5
American wigeon	3
Bald eagle	8
Blue-winged teal	12
Broad-winged hawk	1
Canada goose	7
Common goldeneye	1
Cooper's hawk	3
Double-crested cormorant	1
Duck (unidentified)	1
Eared grebe	2
Gadwall	18
Great horned owl	9
Hawk (unidentified)	2
Hooded merganser	1
Mallard	8
Northern harrier	1
Northern shoveler	4
Red-tailed hawk	26
Ross's goose	42
Rough-legged hawk	4
Sandhill crane	1
Sharp-shinned hawk	2
Snow goose	108
Snowy egret	1
Snowy owl	1
Turkey vulture	8
Grand Total	**307**

Source: USDA APHIS, 2023

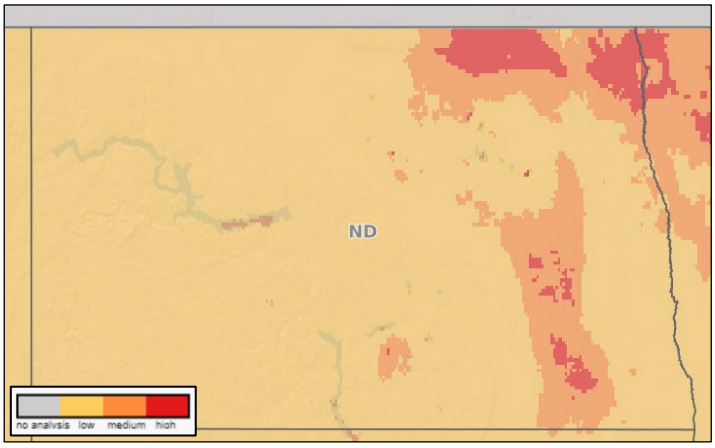
Without rabies vaccination, rabies is fatal in humans and animals, but animal cases remain low in the state (North Dakota Board of Animal Health, 2023). In 2021 and 2022 combined, 662 animals were tested for rabies, with 34 inconclusive results and 16 confirmed positives.

State and federal surveillance and inspection services have also been successful in eradicating or minimizing some of the most damaging plant diseases in the state and keeping emerging threats at bay. Karnal bunt disease is an international threat that has yet to impact North Dakota, and inspection services monitor the food supply for its emergence.

Blight can impact wheat, potatoes, and other grain crops. In recent years, new tools have been developed to help determine the likelihood of blight impacting fields based on weather conditions and

known cases. NDSU has created an app for phones that shows risk for potato blight. The Pennsylvania State University has developed a risk tool for wheat blight, with the North Dakota results for July 26, 2023, shown in Figure 4.7-46.

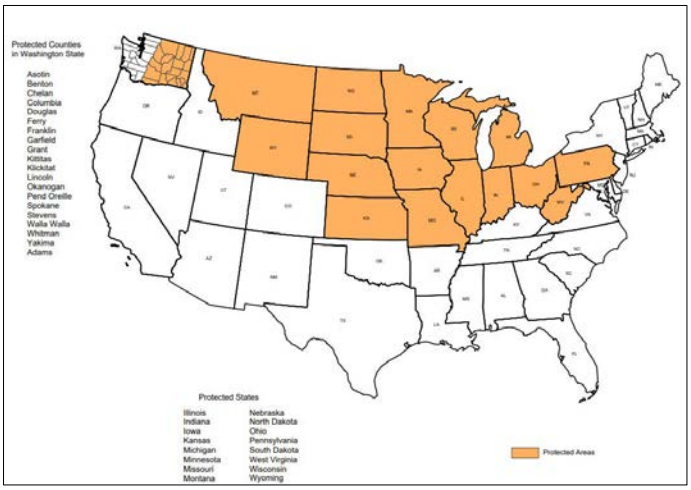
Figure 4.7-46: Penn State University's Fusarium Risk Tool Output for North Dakota on July 26, 2023



Source: Penn State Center for Environmental Informatics, 2023

Rust is another disease that can have a strong negative impact on the agricultural economy of North Dakota. As of 2023, the USDA APHIS has North Dakota listed as a protected area for rust, listing it among 16 states that have eradicated rust susceptible plants, shown in **Figure 4.7-47** (USDA APHIS, 2023). North Dakota's immediate neighbors have eradicated rust as well, reducing the probability that rust will return to the state in the next five years.

Figure 4.7-47: Protected Areas for Rust, 2023



Source: USDA APHIS, 2023

While monitoring and inspections have been instrumental in the reduction of plant and animal disease, the same technology is active in tracking and forecasting of pest infestations. While increased scientific data about the climate and soil conditions that favor pests can produce more accurate forecasts to help farmers prepare and reduce losses, it does little in the face of changing climactic conditions that favor known pests and increase the range of new pests that may find a visit to North Dakota more accommodating than in the past. Grasshoppers are among the pests that prefer drought conditions. With the increase in the severity and presence of drought, the favorability of the state's crops to grasshoppers increases as well (CDC APHIS, 2023). Another pest that arrives to North Dakota in drought years is the blister beetle, which, in addition to devouring crops and grasses, is toxic to mammals, including humans. About 30 can kill a horse, which can complicate feeding programs, as the need for supplemental feeding is highest when the poisonous insects are more likely to be present in the feed (Kraemer, 2021). The increase in global trade can bring foreign pests that spread out over time in search of more nourishment to our continent. This process has brought Emerald Ash Borers to the riverbanks of North Dakota in 2023, after its arrival in Michigan two decades earlier (CDC APHIS, 2023). The probability that it will begin feasting on ash trees in North Dakota in the next five years is extremely

high. Increasing change in the climate and interdependence on trade also increases the probability that the next plan update will need to evaluate the risk from new threats.

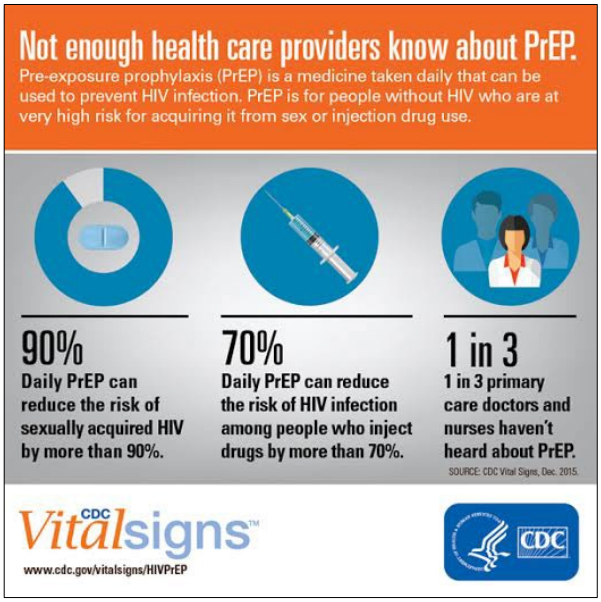
4.7.1.5 Warning Time and Duration

Warning time and duration can vary by the disease or pest, but most have conditions in which they thrive and spread easily. These are often referred to colloquially as seasons. For example, a person can catch influenza at any time of year, however, it spreads most easily in the fall and winter months when people stay inside in enclosed areas, more readily spreading droplets from coughs and sneezes (CDC, 2023). Infectious diseases tend to have more infections experienced in the winter, and the infectious illnesses vary in their duration based on the host's immune system, pre-existing conditions, vaccination status, and relative to the infectious burden load of the disease to which the person was exposed. This is true for COVID-19 and other coronaviruses as well as measles and mumps (CDC, 2023). State and federal health officials monitor reported infections for these diseases to forecast medical need and to advise the public and health care providers to take preventative actions.

Pneumonia is "an infection of the lungs that can cause mild to severe illness in people of all ages" according to the CDC (2022), and this infection can be independent or a co-morbidity with another infection, such as flu or COVID-19.

All of these infectious diseases, including pneumonia, currently have vaccines available that can improve the immune response to exposure and lead to reduced symptoms and duration of those symptoms. Examining both the vaccination rate of the populace and the surveillance data provided by public health agencies can help state and local officials prepare for response to these known diseases (CDC, 2023).

Figure 4.7-48: PrEP helps Prevent HIV



Source: CDC, 2015

What cannot be predicted is the emergence of novel diseases that lack treatment or vaccination, as happened during the COVID-19 pandemic, as well as outbreaks from MERS and SARS previously.

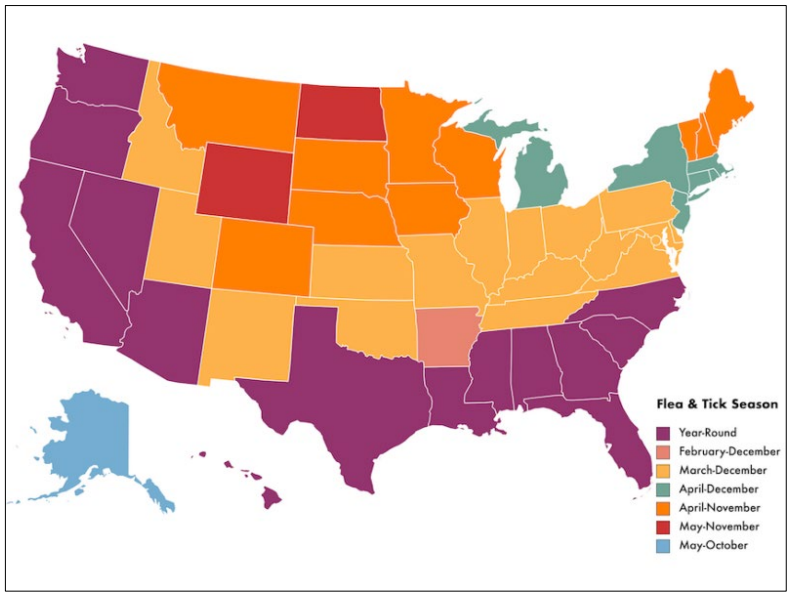
Sexually transmitted Infections provide little warning and may be carried and spread without an expression of symptoms. However, pre-exposure prophylaxis (PrEP) and barrier birth-control measures can reduce transmissibility. Regular testing for sexually transmitted infections also helps identify non-expressive carriers (CDC, 2022). Advances in PrEP since the last plan, as well as in post-exposure prophylaxis (PEP), may reduce STIs over time and decrease the duration of symptoms and illness.

Most food- and water-borne diseases endure for a short period of time, but severe cases can lead to hospitalization for increased care such as intravenous antibiotics and in non-responsive cases, it can lead to death (CDC, 2022).

The emerging threats of West Nile virus and Lyme Disease are spread by arthropod vectors. The best data available for predicting increases are relative to the presence of the vectors for these diseases, which have symptoms that can endure for many years in some cases. Warm, dry weather can allow ticks to flourish and spread Lyme disease. While malaria is a re-emerging threat, malaria in North Dakota has been tied to travel and immigration, typically to countries in which malaria is more common, such as sub-Saharan Africa and South Asia (CDC, 2022). North American outbreaks of locally acquired malaria are uncommon but not unheard of. In 2003, Palm Beach County, Florida, had 8 such cases, and as of October 12, 2023, there were locally acquired cases of malaria in Florida, Texas, Maryland and Arkansas prompting the CDC to issue a public health alert (Procell and Loehrke, 2023). A similar local outbreak is unlikely in North Dakota, due to the lack of presence of mosquitoes that typically carry malaria. Local outbreaks in other areas of the United States increase the likelihood of travel-acquisition of the disease. Malaria is not the only mosquito-borne disease to experience outbreaks in recent years (CDC, 2022). While no Zika Virus cases have been reported in the United States since 2018, an outbreak in Texas and Florida occurred in 2016-2017, demonstrating the ability of vector-borne illnesses to rise to a public health threat with little warning, and to dissipate just as readily.

State and federal agencies also monitor the spread of animal and plant disease to try to keep outbreaks contained, and out of the food supply. This is true not just for livestock and crops, but also for game. Surveillance activities by North Dakota Game and Fish, the North Dakota Board of Animal Health, and the USDA Animal and Plant Health Investigation Service help to identify where outbreaks are spreading and in what type of animal to help reduce the spread and identify areas where testing and inspections may be necessary. Like human disease, animal disease spread by vectors can have “seasons” that end when hard freezes kill off the insects, worms, and fungus that spread the disease. Diseases that are communicably spread such as Avian flu and Swine Flu can be controlled by the culling of herds or flocks where an infected animal is found. Much like human diseases, surveillance can help reduce the spread, but it is a challenge to determine what the next outbreak will be, and there is no warning for when an outbreak will occur or for how long it will endure if preventative actions are not taken.

Figure 4.7-49: Flea and Tick Season in the United States



Source: Meyers, American Kennel Club, 2023

Pests tend to thrive in certain weather conditions and thus can be forecast more predictably than disease. Grasshoppers, for instance, thrive in hot, dry weather, and so they often arrive in late July or August when the state is in its most hot and dry period, and drought and heat waves tend to increase their numbers. Other pests may thrive in wet conditions or are bolstered in numbers when warm

weather occurs earlier in the season, such as the corn borer, which can produce more generations in a season when the warmer period is longer than usual (USDA, 2023). In many cases, there are organic or chemical pesticides that can encourage pests to move on, reducing the financial loss to the farmer.

4.7.2 Consequence and Vulnerability Loss Analysis

This section describes the consequences and vulnerabilities of infectious diseases and pest infestations. Both consequences and vulnerability will be discussed in this section.

A consequence is the "degree of debilitating impact that would be caused by the incapacity or destruction of critical infrastructure or a critical function." Consequences can be tangible impacts to buildings or systems or intangible impacts on processes, business, or reputation. Consequences include debilitating impacts, such as the loss of critical functions, data, and public confidence. It also includes cascading effects that have an effect on the functionality of critical services such as the loss of service of a utility or communications. (FEMA EMI, 2023).

Vulnerability is "susceptibility to physical injury, harm, damage, or economic loss." It considers the extent of injury and damages that may result from a hazard event of a given intensity in a given area (FEMA EMI, 2023). This may be a geographic, social, or economic feature that makes harm from a hazard more likely or more intense.

4.7.2.1 Human Loss

While the risk of infectious disease can be death or disability in humans, the COVID-19 pandemic demonstrated that there are social impacts from the widespread limiting of social interaction to stop the spread of infectious disease (Turcotte-Tremblay, et al., 2021).

The COVID-19 pandemic has exposed a wide variety of positive and negative externalities. Masking and social distancing had obvious and substantial reductions on other common infectious illnesses as seen in the data shown above. Colds, flu, and pneumonia had sharp decreases in case numbers. The time spent at home improved some family units by increasing quality time at home and reinforced social cohesion among some social groups who re-connected or reinforced cohesion through support activities and communication. However, not all family units benefited from increased time together. Domestic violence, child abuse and neglect, and divorce all increased during COVID-19. Stress, the disruption of protective and supportive social networks, decreased access to services, and fewer interactions with the public were contributors to the escalation of domestic abuse. Suicides and mental health crises increased during and after the public health emergency, sometimes in response to increased stress due to changing household economics, stressful essential work, resentment over the lack of employment options, or from regressive social behavior exhibited by adults (Turcotte-Tremblay, et al., 2021).

Some parents struggled with the balance of essential work and having children at home for distance learning, potentially contributing to alcohol and recreational drug use, with some instances resulting in poisoning and overdoses.

Cyberaddiction became a more prominent issue in both adults and children, as well as the negative social outcomes of that, including the increase in human trafficking and targeting of minors for crime.

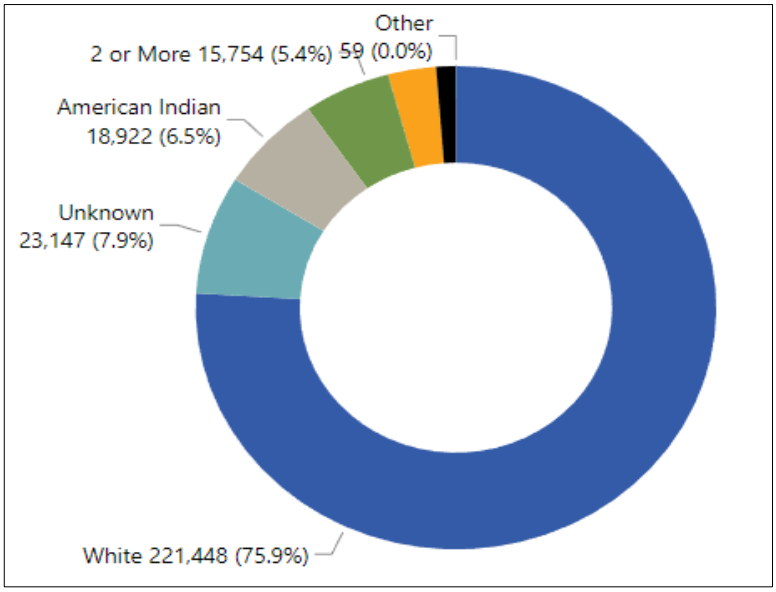
Lacking in-person interaction at schools, children often experienced regressive social development and failure to reach anticipated social milestones. Parents were often more engaged in their children's education and could provide additional engagement in areas where their children needed extra assistance; children could also fall behind when parents were unable to provide the educational assistance otherwise provided by professionals. Where parents were not engaged, school systems more easily lost track of children and were unable to witness signs of abuse or neglect (Turcotte-Tremblay, et al., 2021). Remote learning made cheating and disengagement easier for students, and more difficult for teachers to correct, leading to reduced educational productivity and increased drop-out rates.

There are concerns for justice and equality as it relates to public health restrictions (Turcotte-Tremblay, et al., 2021). Minorities and immigrants are in positions more likely to be deemed essential work, more likely to have essential workplaces that expose them to others, and less likely to have sick-pay benefits, creating a higher probability of infection in communities more likely to experience co-morbidities, health inequities, and pollution and less likely to have equal access to healthcare. Additionally, there are civil rights concerns related to privacy, mobility, and worship.

In the face of infectious disease, health disparities result in increased death and infection among vulnerable communities. The CDC reports that racial and ethnic minorities have higher rates of illness and death across a wide range of illnesses, including diabetes, heart disease, asthma obesity, and hypertension (CDC, 2023). People with these co-morbidities experienced higher rates of death and serious illness from COVID-19 (CDC, 2023). These co-morbidities, also discussed in Section 2, correlate to disproportionate adverse outcomes from other infectious diseases, including influenza and pneumonia (CDC, 2013). The elderly and young people are also more prone to death and serious illness from infectious disease.

Mentioned earlier in the discussion of spatial extent was the higher infection rate for counties with American Indian Reservation within their borders (NDHHS, 2023). **Figure 4.7-50** shows the breakdown of reported infections as of June 2023 American Indians, being just 5.2 percent of the population, accounted for at least 6.5 percent of COVID-19 infections.

Figure 4.7-50: COVID-19 Cases in ND by Race as of June 7, 2023



Source: North Dakota Department of Health and Human Services, 2023

Figures 4.7-51 through **4.7-53** show dimensions of medical vulnerability that would make a person more susceptible to serious illness, disability, and disease from infectious disease.

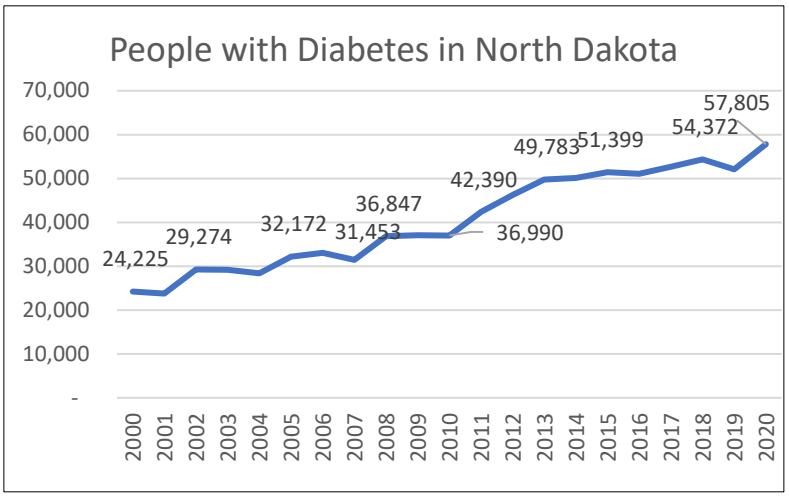
Figure 4.7-51 shows an increase in the total number of North Dakotans who have been diagnosed with diabetes (US Diabetes Surveillance System, 2021). While the total number has grown, it represents a proportional reduction from 14 percent in 2017 to 13 percent in 2020.

Figure 4.7-52 shows rates of heart and lung disease for North Dakotans. More than a third of residents have high blood pressure and more than one in five have high cholesterol (Kaiser Family Foundation, 2023).

Figure 4.7-53 shows lifestyle factors related to health in North Dakota. Smoking, lack of exercise, and obesity can factor into negative health outcomes from infectious diseases (Kaiser Family Foundation, 2023). Almost 70 percent of North Dakota adults are considered overweight and 16.7 percent smoke. Nearly 1 in 5 report binge drinking, and nearly 1 in 4 report no physical activity outside of work.

The stress and trauma of the threat of infectious diseases can be difficult for those who struggle with mental health. The social isolation and

Figure 4.7-51: North Dakotans with Diabetes



Source: US Diabetes Surveillance System, 2021

Figure 4.7-52: North Dakotans with Heart and Lung Disease

Heart Disease Death Rate per 100,000, 2020	147.3
Adults With High Cholesterol, 2019	22.5%
Adults Who Have Ever Been Told by a Doctor that They Have Hypertension, 2021	36.3%
Asthma Prevalence Among Adults, 2017	8.6%
Adults Who Report Ever Being Told They Have COPD, Emphysema, or Chronic Bronchitis, 2021	5.5%

Source: Kaiser Family Foundation, 2023

Figure 4.7-53: Lifestyle Factors Related to Health in North Dakota

Measure	Percent/Age
Life Expectancy at Birth (in years), 2020	76.9
Adult Overweight/Obesity Rate, 2017	69.4%
Adults Who Are Severely Obese (BMI>40), 2021	5.6%
Percent of Adults Who Smoke, 2020	16.7%
Teens (12-17) Who Report Smoking, 2021	5.9%
Adults Who Drink Alcohol, 2020	56.2%
Adults Reporting Binge Drinking, 2020	19.7%
Adults Reporting Alcohol Abuse, 2018-2019	6.8%
Adults Reporting Drinking and Driving, 2020	2.0%
Teens (12-17) Reporting Drinking, 2020	23.7%
Teens (12-17) Reporting Alcohol Abuse, 2018-2019	2.4%
Adults Reporting Not Always Wearing Seatbelts, 2020	25.1%
Adults Reporting No Physical Activity except Work, 2020	24.6%

Source: Kaiser Family Foundation, 2023

insecurity of work and the future contributed to mental health crises and suicides during the pandemic (Kaiser Family Foundation, 2023). **Figure 4.7-54** shows that 1 in 5 North Dakota adults reported mental illness and 1 in 20 reported suicidal ideations in the year preceding the pandemic.

Given the rates of infection, it should not be surprising that American Indians in North Dakota had a higher rate of vaccination (63.0 percent) than any other race in the state as of June 2023 as shown in **Figure 4.7-55** (NDHHS, 2023). Similarly, vaccination rates for those 80 and older were the highest than any other any other age group in North Dakota as shown in **Figure 4.7-56**.

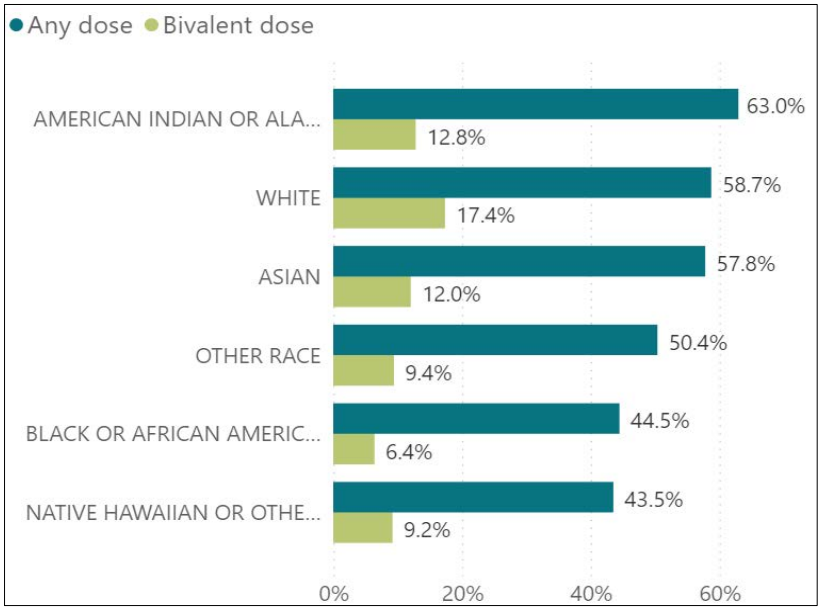
For many communicable diseases, ethnic and racial minorities have a disproportionate infection rate. For example, HIV has higher rates in the LGBTQ+2S? community, and even when controlling for sexual orientation, infection rates are higher in ethnic and racial minorities, with rates in the African American community four times the rate of white people.

Figure 4.7-54: Mental Health in North Dakota

Adults Reporting Mental Illness, 2019	20.5%
Adults Reporting Serious Mental Illness, 2019	5.0%
Adults Reporting Having Serious Thoughts of Suicide, 2019	5.3%

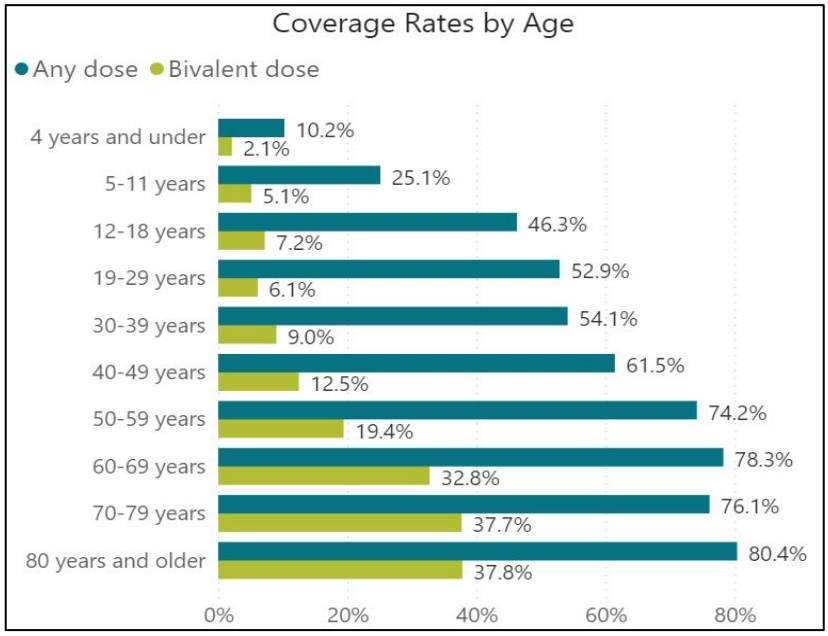
Source: Kaiser Family Foundation, 2023

Figure 4.7-55: Covid- 19 Vaccinations by Race in North Dakota



Source: North Dakota Department of Health and Human Services, 2023

Figure 4.7-56: ND COVID-19 Vaccinations by Age Group as of May 2023



Source: North Dakota Department of Health and Human Services, 2023

4.7.2.2 First Responders

As discussed earlier, the COVID-19 pandemic kept healthcare facilities near or over capacity much of the time during the public health emergency period. In addition to keeping the workload high for first responders and hospital professionals, this also increased transfers both in and out of state and created workforce shortages at hospitals (Turcotte-Tremblay, et al., 2021). In August 2021, a half million Americans left healthcare professions, and in November 2021, 32 percent of registered nurses said they planned to leave their current role. Reasons listed for these departures were insufficient staffing, low pay, lack of support, and the emotional toll of the job.

There were additional health impacts that had consequences for first responders. The one-track focus on COVID-19 leads to other major health crises that can develop, such as measles and mumps outbreaks, it can lead to personal decisions to delay health interventions so as not to further tax the healthcare system, leading to a more critical need when response is finally sought. This has been tied to a 15 percent increase in excess mortality from preventable health conditions (Turcotte-Tremblay, et al., 2021). This can cause additional stress among responders. Medical supplies and medications used to treat COVID-19 fell into shortages, including needles and respirators. This increased prices, impacting hospital budgets, and creating a black market for counterfeit goods that increased liability and negative health impacts (Turcotte-Tremblay, et al., 2021; US Food and Drug Administration, 2023). First responders also respond to the increase in domestic violence and child abuse calls, increasing their stress.

Figure 4.7-57: Lake Region Ambulance

Source: Premier Specialty Vehicles, 2023. Reprinted with permission.

Many rural first responders are volunteers, and rural communities in North Dakota report that they are struggling to retain and recruit volunteers who can commit their time and energy. There is also uncertainty around the funding to sustain ambulance districts, especially as healthcare costs increase. Ambulance services cost around $1 million per year to operate and the cost of a new ambulance has increased from around $100,000 to $200,000, which can be a challenging spike for rural communities to meet. North Dakota has one of the lowest rates for ambulances per square mile, with fewer than 3 per 1,000 square miles, which can extend the time that paramedics and EMTs spend stabilizing a patient, increasing the stress of the job (Standaert, 2023). For this and other reasons, there is a shortage of younger volunteers, and a growing problem.

4.7.2.3 Environmental, Natural, and Cultural Resources

There were positive externalities for the environment related to the COVID-19. Fewer people commuting and socializing reduced traffic and improved air quality. Fewer people gathering in public

spaces led to less litter. However, more time at home led to an increase in waste and recycling was often suspended to reduce social gathering (Turcotte-Tremblay, et al., 2021). The decrease in demand for energy led to a drop in crude oil prices and the increase in abandoned oil wells (NDMR, 2022) and closing of lignite mines (Cramer, 2023; OSMRE, 2023). The state used federal CARES Act (oil well) and Bipartisan Infrastructure Bill (mines) monies for reclamation of these closed and/or abandoned facilities.

Plant disease and pest infestations can take a toll on the environment beyond their impact on crops. Pests can destroy pastures for livestock and destroy grasslands. **Figure 4.7-58** shows the impact of grasshoppers on a field in McKenzie County which, according to Jensen and Donahue (2022) was determined by USDA APHIS analysis to be a prime location for grasshoppers during the summer of 2022.

Figure 4.7-58: Damage from Grasshoppers in McKenzie County

Before

After

During

Source: Jensen, NDDES, 2022

Endangered species represent a vulnerability in natural resources. The 2022 HPAI outbreak was driven by wild birds, and there is nothing about being one of the remaining few of a species that protects an

animal from disease. At least three wild birds that frequent the state are endangered, and diseases like HPAI pose a threat to their continued existence.

Similarly, pests do not stop feeding at land borders nor do they avoid local, tribal, state or nationally protected landscapes, thus these areas face the same risks of being devoured or diseased as agricultural lands. Pests and plant disease appear to show little reverence for Sacred Lands or communal grounds.

Communal space and cultural events pose a risk and are more at risk from infectious disease. Areas where people gather can serve as accelerators of infectious disease by bringing the infected and healthy together. Perhaps most famously, a 1918 war victory parade in Philadelphia, shown in **Figure 4.7-59**, spread Influenza so effectively that the city became the hardest-hit city, with hospital beds full within 72 hours of the event and 12,000 dead within 6 weeks of the parade (Meier, 2019). Community events that bring people together are also typically at risk of being canceled or delayed when there is an outbreak of an infectious disease.

Figure 4.7-59: Photo from Philadelphia Liberty Bonds parade, 1918

Source: Wikimedia Commons, National Archives and Records Administration.

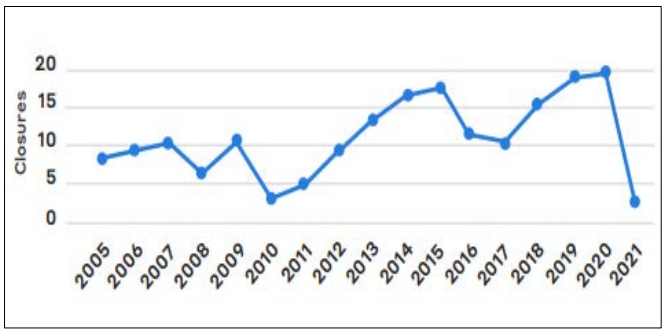
4.7.2.4 Property, Facilities, and Infrastructure Damage

Development and adoption for remote activities extended beyond government activity and created new ways for people to gather, conduct work, and engage socially. Many groups that had needed facilities for meetings began to meet virtually and may continue to meet that way or engage in hybrid activities that reduce the need for space. While this represents a change in how work is conducted, it also represents a fundamental shift in how business space is used, reducing the need for some office space and, in the short term, eliminating the need for gathering space for socializing. Facilities that were designed for public gatherings often struggled financially during COVID-19 as these activities were delayed, canceled, or moved to a virtual space (Turcotte-Tremblay, et al., 2021). Many workers that went to remote work remained remote after the emergency had passed, reducing the need for office space and utilization of office supplies and utilities in that space, which has enduring impacts on the economy and in our urban spaces. These utilities and office supplies are now being distributed across home office spaces, which can lead to a re-allocation of utility needs from urban centers to residential areas.

4.7.2.5 Critical Facilities, Community Lifelines, and State Assets

Rural health care workers and hospitals were especially vulnerable, partially due to their increased burden prior to the pandemic that was made worse by the event. Before the pandemic, rural healthcare was struggling to fill open positions and keep hospitals open. Nationally 116 rural hospitals closed between 2010 and 2019 as shown in **Figure 4.7-60**. While federal funding during the pandemic bolstered many rural hospitals that were struggling financially in the short term, the heavy reliance on Medicare and Medicaid in rural hospital will place many of these facilities back into a precarious existence shortly, making rural hospitals and responders vulnerable. One-way travel to healthcare increased by 20 minutes between 2012 and 2018 in rural America due to hospital closures, with inpatient and emergency care most at risk. Staffing struggles in rural healthcare were made worse by burnout from the pandemic and an inability to provide wages comparable to urban competitors (Bipartisan Commission on Rural Hospitals, 2022). A North Dakota hospital executive also cited concerns that watching the pandemic unfold would discourage young people from entering the field, exacerbating rural health workforce shortages.

Figure 4.7-60: Rural Hospital Closures, 2005-2021



Source: Bipartisan Commission on Rural Hospitals, 2022

4.7.2.6 State Economy and Economic Disruption

Mandatory closures for in-person businesses in March and April 2020 economically impacted small business and municipal and state revenues. The implementation of the ND Smart Restart plan created additional costs for conducting in-person business, including decreasing the number of customers that could be served, masking and testing requirements, and social distancing (Turcotte-Tremblay, 2021).

The economic impacts of the shutdown prompted an April 2020 protest at the Capitol of about 150 people (Nicholson, 2020). Some of these businesses found the shutdown and decrease in customers that corresponded with the pandemic too much to financially endure leading to an increase in bankruptcies and financial assistance.

Agriculture (24.0 percent) and utilities (2.2 percent) experienced growth during COVID-19, while the state experienced a general 3.5 percent economic contraction, placing it approximately in the middle of the nation for economic impact (Stebbins, 2021). However, prices for commodities dropped, leaving farmers, rural municipalities, and the state struggling.

The COVID-19 pandemic had several unanticipated impacts on the oil industry. A reduction in demand from the lack of commuting and traveling caused the price of oil to plummet leading to layoffs. There was a reduction of more than 10,000 jobs in North Dakota's oil counties and unemployment went from 1.8 percent to 7.9 percent, nearly doubling the state's average of 4.1 percent unemployment, and a reduction in hours of those still employed. Economic effects ensued in oil counties (Sisk, 2021). Occupational changes and workforce competition when crude oil prices rebounded created a workforce shortage in North Dakota as workers often preferred warmer states where there were more jobs than workers.

Figure 4.7-61: Shifting to Remote Work Helped Those with Mobility Issues

Source: Sunrise Medical, 2021. Reprinted with Permission.

The shift to more remote work had effects beyond the office real estate industry (Smart, 2022). Remote work increases opportunities for those who are homebound or struggle with mobility issues, increases the pool of workers beyond the local area, and allows people who also have caretaker duties in the home more opportunity to participate in the workforce.

When COVID-19 restrictions went into place in March 2020, 20.5 million workers joined the nation's unemployment rolls, which were bolstered by federal aid, within a month. The onset of restrictions and changes, stress of essential work, and increased need for caretakers created an opportunity to reconsider career choices. This created a post-COVID-19 worker shortage, which combined with death and disability, had substantial impacts on the overall American economy. Early retirement, career changes, and decisions to stay out of the workforce created a worker shortage when restrictions ended. Retirees under the age of 65 increased 2.2 percent as early baby boomers reached retirement age with the onset of the pandemic (Smart, 2022). Reductions in immigration took 1 million workers out to the economy. This created what was coined The Great Resignation, leaving less competitive, lower paid, and low-skilled jobs unable to be filled. By 2022, there were 4 million more jobs than workers with wages rising 5 percent.

In government, losses in income at the household level result in lower tax revenues to provide government services. Economic impacts from COVID-19 caused Governor Burgum to request 5 to 15 percent reductions in the 2021-2023 budgets, with plans to tap into rainy day funds (Thompson, 2020). The same results could come from animal diseases, plant diseases, or pest infestations, especially considering the importance of agriculture in the state economy.

Outbreaks in plant and animal disease can have substantial economic impact on individual farms and can have impacts in sectors of the agricultural economy when a pest or disease targets a crop. Animal disease can have impacts beyond the infected animal. Positive HPAI cases led to a culling of flocks to

stop the transmission of the disease, which can have cause significant economic impacts for individual farms or farm communities.

COVID-19 demonstrated the vulnerability in supply chains and the criticality of low-skilled labor in the economy. Shutdowns from outbreaks in the food processing industry early in the pandemic impacted food supplies and prices. Like most essential workers, meatpackers work in close and interactive space, making social distancing impossible, and increasing their risk of infection. Outbreaks in the food processing industry were among some of the earliest in the United States, and most of the infected were poor, uninsured, and spoke English as a second language. This provided an impossible logistical hurdle to a safe workplace and financial jeopardy from missed wages for low-income households (Lussenhop, 2020). By February 2021, 53,000 meatpacking workers at 569 U.S. plants had contracted COVID-19 and 277 had died (Balagtas and Cooper, 2021). Many who could skip shifts chose not to go in when infection rates were high, further straining the plant. Shutdowns and work productivity loss in factories in the food and other industries led to product shortages, backlogs, and limitations of up to 45 percent on slaughter capacity (Loon,2020; Balagtas and Cooper, 2021). This created a shortage of processed meat, ranchers seeking buyers for cattle ready for slaughter, and an increase in price of 80 cents per pound within three months of the pandemic being declared, while prices paid to the rancher fell nine percent.

In the first quarter of 2020, world trade fell 14 percent, and the market shifted to accommodate a new normal, including a shift from food service demand to grocery-store retail demand when school and work cafeterias and restaurants and bars shut down or reduced service. Shutdowns in factories overseas were just as influential in the global market. Shortages exposed the vulnerability of the global supply chain. Limited operations put raw materials in short supply driving up costs and creating delays that have persisted for years. Transportation delays from closed ports and logistics labor shortages contributed to the disease's direct impact of outbreaks (Goodman and Bradsher, 2021). Among some of the more impactful shortages were the shortage of computer chips, lumber, baby formula, and tampons.

While healthcare professional shortages have been discussed previously in this section and in Section 2 of this document, animal disease consequences can be negatively impacted due to Veterinary Shortages. **Figure 4.7-62** shows Veterinary Shortage Declaration requests for 2022 and 2023 in the state. The state has been experiencing veterinary shortages for several years. There is also no veterinary school in the state, which makes competition for young vets more challenging. Seven counties have requested formal declarations for livestock practitioners and all of them are in the western portion of the state where cattle ranching is common (USDA, 2023). The shortage in a cattle-heavy area places the state at a greater risk of missing a diagnosis or delaying a diagnosis in a manner that allows more harm.

Figure 4.7-62: Veterinary Shortage Declaration Requests in North Dakota, 2022-2023

TYPE OF SHORTAGE	2022	2023
Type II Shortage: Private Practice – Rural Area Food Animal Medicine	Adams, Bowman, Grant, Hettinger, Sioux, Slope	McKenzie County
Type III Shortage: Public Practice	Statewide	Statewide

Source: USDA, 2023

Concentrated Animal Feeding Operations (CAFOs) or feedlots bring together a large number of animals to prepare for slaughter and that provides a point of vulnerability for animal disease (Moyer,2016). An infected animal arriving at a CAFO has the potential to transmit to a large number of other animals, creating a mass casualty event and a secondary concern with disposal.

4.7.2.7 Delivery of Service and Continuity of Operations

While the initial shutdown of most government activity put government services on pause, the need to develop long-term remote methods of accommodating the public was accelerated, including remote meetings like the North Dakota Public Service Commission meeting shown in **Figure 4.7-63**. In many ways, North Dakota's rural nature worked for it in this realm.

Figure 4.7-63: Remote North Dakota Public Sercice Commission Meeting April 2020

Source: North Dakota Public Service Commission, 2020

Much of the technology needed was already in use to accommodate the low-density population of the state spread across wide distances. Those services just had to be expanded. These included limiting press room to credentialed media and making it otherwise available online, on public access television, and through social media. The lack of open offices for government services can limit access to those who need them, but the wide deployment of technology and protocols that allowed for fully remote operations provided access to the homebound, disabled, those far away, or others that had struggled to access these services otherwise. The expansion of technologies that allow for remote services increase access for these individuals well beyond the COVID-19 emergency. The movement of government meetings to remote technology encouraged civic participation by allowing people who may otherwise find participation difficult by making it much easier to log-on from home and participate while still attending to children or other household responsibilities or needing to access burdensome travel access or take time out of busy schedules to commute to meetings.

The ability to move some work to remote even after the emergency had passed has meant a reduced need for office space, new methods for delivering services, and reduced dependence on paper in the office. This can lead to a reduction in costs over time that may have taken longer to develop without the motivation to change to accommodate public health protocols for COVID-19. Conversely, the immediate need to increase disinfection, access to masks, and personal protection in the office setting, such as plexiglass barriers and larger waiting areas, often created an unanticipated and large unaccounted for budget item and a reconsideration of the configuration of office space (Turcotte-Tremblay, et al., 2021). Department of Fiscal Services, (2023), reports the state spent $11,380,366.39 on PPE and sanitation during the pandemic.

Public Health officials at the state and county levels had to mobilize to meet the growing needs of the community for testing and administering vaccinations on a mass scale. Large-scale testing and vaccination facilities were sought, and sometimes temporarily built, including a testing site at the State Capitol. A mobile vaccination site is shown in **Figure 4.7-64**. Unemployment and home service needs had to be expanded to meet the service needs for people at home, including the delivery of meals to children entitled to free lunch from schools. In-person services, such as home visits, had to be altered or delayed.

Figure 4.7-64: Vaccination site at Drayton near the border.

Source: North Dakota Department of Transportation, 2021

The pandemic increased the adoption of technology and new protocols that moved some operations to a virtual environment. This includes public meetings and distance learning in public school. While this gave some people unprecedented access to public participation for the first time, it also strips access and creates hurdles for households that do not have access to quality Internet service. In 2023, 6.7 percent of North Dakota did not have Internet access with at least 25mbps downloads available and 5.6 percent lacked access to at least 1G broadband. In Steele and Golden Valley counties, less than 50 percent of the county had 100 mbps Internet coverage. Across the state, 16 percent of households lacked internet access in their home, and this included 37 percent of households with less than $20,000 in annual household income (Broadband Now, 2023). Expanding Internet access or developing methods to meet the needs of these households is critical to continuing to serve the whole community.

4.7.2.8 Public Confidence in the State's Governance

COVID-19 tested the public confidence in governance at all levels. It also made clear what role public health experts can have in shaping policy. Faced with a deadly, contagious, disease, for which definitive treatment was not available, the government is viewed by the public as the entity with access to the information and resources that dictate their survival. Public messaging about how to behave to protect themselves from the disease, how to operate businesses safely, and how the disease spreads and infects people was critical to North Dakotans during COVID-19. An example is shown in **Figure 4.7-65**. While the national COVID-19 emergency ended nationally in 2023, Governor Burgum declared the end of the state COVID-19 emergency on April 30, 2021, making it just the second state to end the emergency declaration, citing advances in vaccines. North Dakota had one of the shortest mask mandates in the country.

Figure 4.7-65: Health Safety Signage during COVID-19

Source: University of North Dakota, 2023

Initially state messaging identified three thresholds based on risk with related guidance as to how to hold public gatherings on March 11, 2020. That weekend, the state closed schools for one week, and the next week restricted access to state facilities, closed bars and in-person dining, and introduced distance learning. The state marked its 30th case of COVID-19 11 days after the first case was identified. In response, by the end of the month, the state had accepted federal aid for first responders, increased access to childcare for essential workers, extended work compensation to cover COVID-19, enabled easier access to absentee voting, suspended unemployment taxes on businesses, encouraged social distancing, and moved government meetings to remote operation (Burgum, 2020). Other states took different actions at different times, creating a national patchwork of public health approaches.

Acting and failing and inaction in response to the pandemic bred criticism of state actions. Without clear information from the federal government and scientists, North Dakotans developed their own guidance and policies about state actions. Protests against COVID-19 mandates and support for mandates followed. When allowed to re-open after one of the briefest shutdowns in the nation, businesses often established their own rules based on personal judgments, some remaining closed longer than required or altering how they conduct business. The public's confidence in state governance was either bolstered or harmed with each action or the controversial and nationally politicized response. However, states that took different actions at different times were no more or less impacted.

North Dakota adopting technology and remote state functions prior to COVID-19 helped boost public confidence in the state. Those in the state government responsible for these services had experience

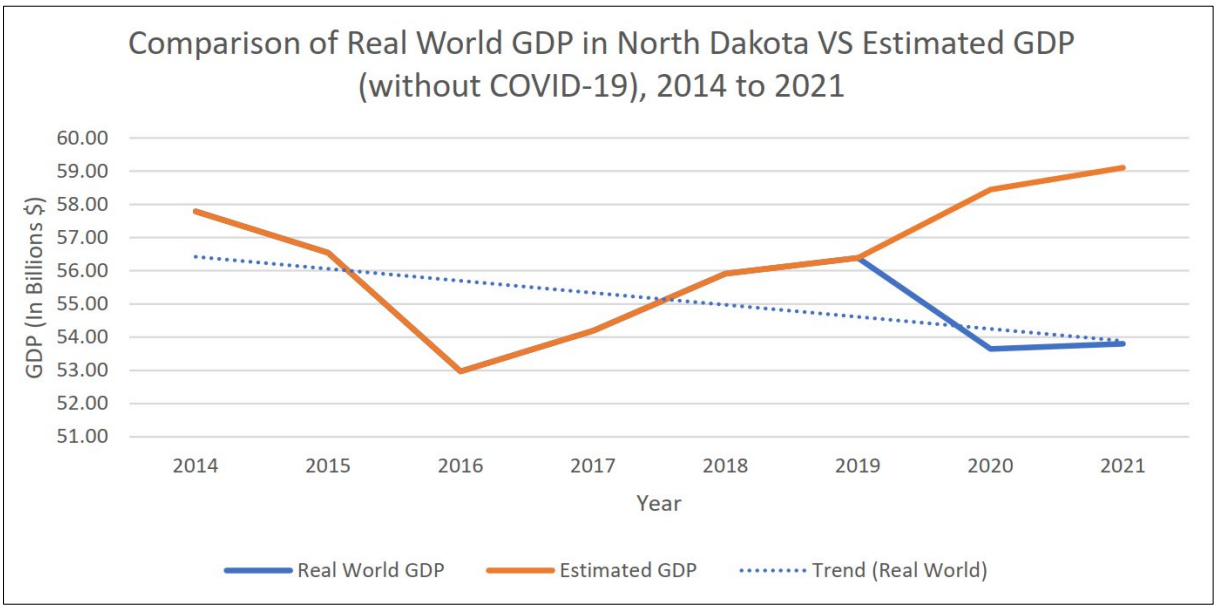
and skills in this arena that limited expected hiccups in the delivery of services. Comfort in use made message delivery through technology an easier adjustment for both state employees and the public.

4.7.2.9 Estimation of Annual Losses

Much of the loss incurred from infectious disease comes in the form or loss of life, loss of quality of life or loss of potential productivity due to impacts on human health caused by death, severe illness, lost time, and/or disability from disease. This would be impossible to quantify.

The North Dakota Department of Commerce (2023) estimated the impact to the state Gross Domestic Product had COVID-19 not occurred as shown in **Figure 4.7-66**. This can allow for a loss estimate to be generated in purely economic terms. What would have been expected to be a state GDP of just more than $59 billion in 2021 ended up just under $54 billion, thus a $5 billion loss due to the pandemic. Combined with 2020 losses, that's a $7.25 billion impact from disease.

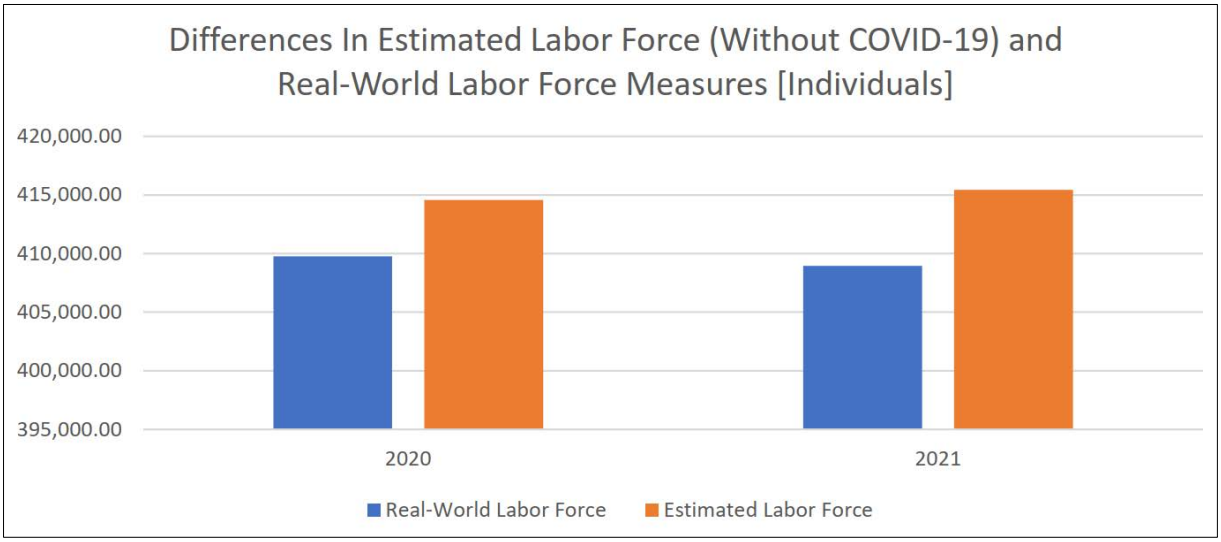
Figure 4.7-66: COVID-19 Impact on State GDP



Source: North Dakota Department of Commerce, 2023

Another manner of estimating loss includes lost job growth. North Dakota had experienced steady annual job growth for several years that ceased during the pandemic as shown in **Figure 4.7-67** (North Dakota Department of Commerce, 2023). If these jobs paid the average wage for jobs in the state, the loss estimate in wages from COVID-19 would be $525,053,968. This loss of income also impacts state and local revenues.

Figure 4.7-67: COVID-19 Impact on State Labor Force



Source: North Dakota Department of Commerce, 2023

Similarly, while the value of a culled animal may be quantifiable, it would be difficult to measure the impact of the loss of animal weight due to poor health, the indirect impacts created by the loss of a laying chicken or a dairy cow, or the loss of opportunity to calve and expand a herd.

Crops, however, are insured and their losses from pests and plant disease can be estimated by looking at the indemnity amounts submitted for claims to the USDA Risk Management Agency as shown in **Figure 4.7-68** (USDA RMA, 2023). Crop losses in the state from 2018 to 2022 averaged $5,654,099, with wheat losses leading the 16 crops that experienced losses from pests and plant disease.

Figure 4.7-68: Crop Insurance Indemnity Amounts for Pests and Plant Diseases in North Dakota, 2018-2022

Commodity	Amount	Annualized
Corn	$ 781,492.60	$ 156,298.52
Soybeans	$ 2,183,065.79	$ 436,613.16
Wheat	$ 14,350,926.92	$ 2,870,185.38
Canola	$ 3,425,755.80	$ 685,151.16
Dry Beans	$ 31,287.00	$ 6,257.40
Dry Peas	$ 1,805,804.85	$ 361,160.97
Sunflowers	$ 2,167,386.22	$ 433,477.24
Sugar Beets	$ 1,183,449.90	$ 236,689.98
Barley	$ 614,127.10	$ 122,825.42
Potatoes	$ 462,507.00	$ 92,501.40
Flax	$ 662,529.25	$ 132,505.85
Oats	$ 194,094.55	$ 38,818.91
Forage Production	$ 207,099.25	$ 41,419.85
Buckwheat	$ 22,973.25	$ 4,594.65
Mustard	$ 176,346.00	$ 35,269.20
Forage Seeding	$ 1,650.00	$ 330.00

Source: USDA Risk Management Agency, 2023

4.7.2.10 Community Resilience

In many ways, being rural worked to North Dakota's advantage during COVID-19. Over and above the obvious that infectious diseases of all types move less quickly and efficiently through less dense populations, many of the challenges of isolation and distance from the pandemic are the same as isolation and distance from being rural. Challenges of healthcare worker shortages, first responder burnout, remote meeting technologies, and connecting people across long distances were regular struggles the state faced ahead of the pandemic, and that the allowed the state to move forward with less abrupt change. State and federal aid that helped those economically displaced from the pandemic eased some of the household shocks.

Many groups of underserved individuals became apparent during COVID-19 as we moved into a state of isolation. Quarantines and isolation had a profound impact on society in many ways leading to social, financial, and psychological repercussions. Intimate partner violence or domestic violence increased with CVIC, a Grand Forks-based Community Violence Intervention Center (CVIC), reporting that advocates and law enforcement assessed nearly 60 percent of individuals in high lethality situations (Kelly, 2022). In 2021, 790 adult victims were served with 5,417 new victims served using the statewide domestic violence coalition. Professionals saw a spike of events during COVID-19 and continue to see a gradual increase of cases to this day.

Advances in medicine and agricultural science may be the most promising tools of resilience in fighting infectious diseases and pest infections. Vaccinations and treatments for a broad range of disease and improvements in seeds and pesticides can limit the harm vectors can enact.

4.7.2.11 Future Conditions

This section evaluates how changes in existing conditions may impact the risk posed from infectious disease and pest infestations in the future.

Through the end of this century in North Dakota, expect larger, more frequent, and more intense outbreaks of certain infectious diseases and pests, though some human and animal diseases may decrease in occurrence. The following list is based on information extracted from the NOAA National Centers for Environmental Information, summary for North Dakota (Frankson, 2022), the Fifth National Climate Assessment (Knapp, 2023), and related resources:

- **Location:** Future climate conditions will influence vector-borne disease prevalence, but the direction of the effects (increased or decreased incidence) will be location and disease specific. Animal and plant diseases, noxious plants, and/or pests may spread to more northern regions, or spread more quickly, as average temperatures increase.

- **Extent/Intensity.** Intensity and extent of certain human, animal, and plant diseases are projected to increase. Warmer and/or moister conditions may increase the prevalence of parasites and diseases that affect livestock and crops (i.e., the earlier onset of spring and warmer winters could allow some parasites and pathogens to survive more easily), leading to higher per unit infestation/infection and/or more debilitating per unit impacts.

- **Frequency.** Future climate conditions may affect the frequency of infectious diseases and pest infestations (more/less).

- **Duration.** Future climate conditions may affect the duration of human disease, some more and some less. With warmer winters, some existing agricultural pests can persist year-round.

4.7.2.11.1 Extreme Climate Variability and Climate Change

Through the end of this century, North Dakota's natural yet extreme climate variability will likely continue to be the primary influencer or signal within each natural hazard (Frankson, 2022). This may directly or indirectly impact jurisdictions and peoples across the state, over days to decades long timescales, while the much more subtle and gradual trends of climate change over the rest of this century are likely to further extend the range of such variability (Knapp, 2023). As studies show both trend and variability could well extend beyond that which has previously been documented in the historical record.

Recent climate change trends have shown, and future projections suggest, that the state can expect continued gradual warming in all seasons, with greatest warming in the winter season (Swain, 2015). Overall precipitation is likely to increase, but with a high degree of inter-seasonal and interannual variability, which could lead to longer and stronger droughts, with a commensurate increased risk of wildfire, interspersed with more frequent and more intense flooding. Severe summer and winter season storms, with strong to extreme winds which often affect power grids and transportation corridors, will likely continue to occur in both drier, drought-prone periods, and wetter, flood-prone periods within the state's overall extreme climate variability (Easterling, 2017). And though the total number of storms may not change significantly, their overall size and impact likely will.

4.7.2.11.1.1 Impact

Within the state, and across the Northern Great Plains (NGP) in general, climate trends and projections indicate that warmer temperatures will support an increase in certain vector-borne diseases, such as West Nile virus (Harrigan et al., 2014), some of which can impact both humans and animals. According to North Dakota Health and Human Services (NDDHHS-West Nile Disease, 2023) and the CDC, warmer and wetter conditions would generally contribute to increased risk of exposure to West Nile virus.

According to the CDC (CDC-Campylobacter, 2023), the Campylobacter bacteria is the most common cause of diarrheal illness in the United States. Climate studies in similar northern European climate zones have shown that warmer overall temperatures and increased flooding are expected to raise the risk of water-borne diseases such as Campylobacter.

Impacts of future climate on Avian Flu outbreaks is still uncertain. According to the OSHA topical guide, (OSHA, 2023) transmission of Avian Influenza (AI) is generally from wild birds to domestic birds though there is rare transmission to humans. Potential climate change influences on agro-ecosystems and the contact points between wild waterfowl and domestic birds may alter the epidemiology of Avian Influenza (Gilbert et al., 2008). Focus is shifting back to Prairie Pothole Region maintenance, as recent wetland modelling suggests that wetland resiliency is less influenced by climate variability/change and more influenced by land-use changes.

The warmer and wetter conditions projected for the Northern Great Plains are expected to increase the abundance and competitive ability of various invasive species (Blumenthal et al., 2013; Blumenthal et al., 2016) and the range and reproductive success of crop pests (Wienhold et al., 2018).

Hotter and drier conditions can also create increased pathways for disease vectors (Williams et al., 2022). For instance, the incidence of early spring snowmelt flooding with concurrent heavier rainfall is likely to increase and can be worsened due to loss of ground cover from past wildfires, "putting people at risk for water-borne diseases, trauma and increased mental health issues, and economic losses".

The Johns Hopkins guide on Winter Illness (Albert et al., 2023) states that, "Colds, flus and other respiratory illnesses are more common in colder months. People are indoors more often, allowing viruses to pass more easily from one person to another. And the cold, dry air may weaken resistance." With that, there is some suggestion that a future climate with milder and/or shorter winter seasons could reduce the incidence of human influenza and other forms of respiratory illness.

4.7.2.11.1.2 Adaptation

Direct impacts from extreme climate variability, current trends, or projected climate change on infectious diseases and/or pest infestations in the Northern Great Plains region are associated with overall warmer conditions and the potential for increased pathways for certain disease vectors and vector-borne disease. Adaptation measures would likely mirror those involved in current or proposed disease/pest monitoring and control measures with an added tracking of diseases and pests more common in neighboring wetter and/or warmer areas of the adjacent Central Plains states.

4.7.2.11.1.3 Mitigation

Many of the current or proposed actions employed to counter certain disease vectors, vector-borne diseases, and pest infestations may also be viable for countering future increased vector pathways caused by the projected increase in temperature and/or precipitation. These include, but are not limited to:

- **Agriculture.** The expected increase in temperature and likely increase in precipitation will likely lead to a continued change in the distribution of crops grown in ND due to a longer growing season and an earlier frost-free period, and that the amount of corn and soybeans produced in the state will likely increase (Wienhold, 2017). Which also points to the need for appropriate crop rotations to break potential weed, insect, pest, and crop disease cycles, while maintaining a healthy overall ecosystem.

- **Livestock and Grazing.** Strategies may involve moving livestock at night when temperatures are cooler and supplementing feeding to augment protein and energy needs, given potential digestive issues resulting from forage grown under higher carbon dioxide levels (Derner et al., 2023). Feedlot and pasture management could incorporate soil health management practices that enhance infiltration and reduce runoff during heavy rainfall episodes and preserve moisture during drought (Derner, 2017). Prescribed burns in pastures could reduce invasive weeds such as Kentucky Bluegrass and Sweet Clover, while preserving hardier natural grasses.

- **Forestry.** Proper thinning of native and non-native forests, shelterbelts, and urban forests, to include a systematic introduction of pest-tolerant, well-adapted, low-maintenance, long-lived, and drought-resistant trees to ensure greater resilience (Safford et al., 2013; Claeys, 2020).

- **Water Supply/Water Quality.** In addition to developing regional water supply projects (NDDWR, 2023), concurrent efforts to reduce harmful agricultural (Derner, 2017), industrial, and urban runoff will become even more critical under future climate conditions. And maintaining healthy wetlands will provide a high resiliency to future climate conditions, while helping to stabilize and cleanse our *in-situ* water supplies.

- **Human Health.** As mentioned above, both adaptation and mitigation measures would likely mirror those involved in current or proposed disease/pest monitoring and control measures with an added tracking of diseases and pests more common in neighboring wetter and/or warmer areas of the adjacent Central Plains states.

4.7.2.11.2 Other Changes

As human development push into new territories, there are increased encounters with wildlife, undisturbed soil and unfamiliar plants and arthropods. These interactions can lead to the emergence of new diseases that can impact humans, livestock, and plants around the world. World travel increases the speed at which novel diseases can spread across the globe.

It is not only the movement of people that threatens to spread new diseases and pests. The United States imports about 15 percent of its total food supply from other countries which may face an entirely different set of vectors and plant an animal disease (US FDA, 2023). An increasingly globalized world increases the likelihood of emerging new threats from far-off places. It is not just food that is threatened. The Emerald Ash Borer hitchhiked on a shipping pallet from northern Asia to Detroit (Wisconsin Department of Natural Resources, 2023). The next big threat could come from a shipment of anything to any North American port.

Cascading impacts are those that are exacerbated by either sequential or coincidental factors, either natural or anthropogenic in origin (Crausbay, 2020). Both drought and flood can cause or contribute to cascading impacts in ecological environments and human communities, including those that are primarily driven by natural conditions and those that may be human-induced and/or human-modified.

4.7.3 Risk Analysis

Risk can be defined as the potential for loss of or damage to an asset (FEMA EMI, 2023). This section analyzes the potential for loss or damage in the state of North Dakota.

4.7.3.1 National Risk Index

The National Risk Index does not evaluate this hazard.

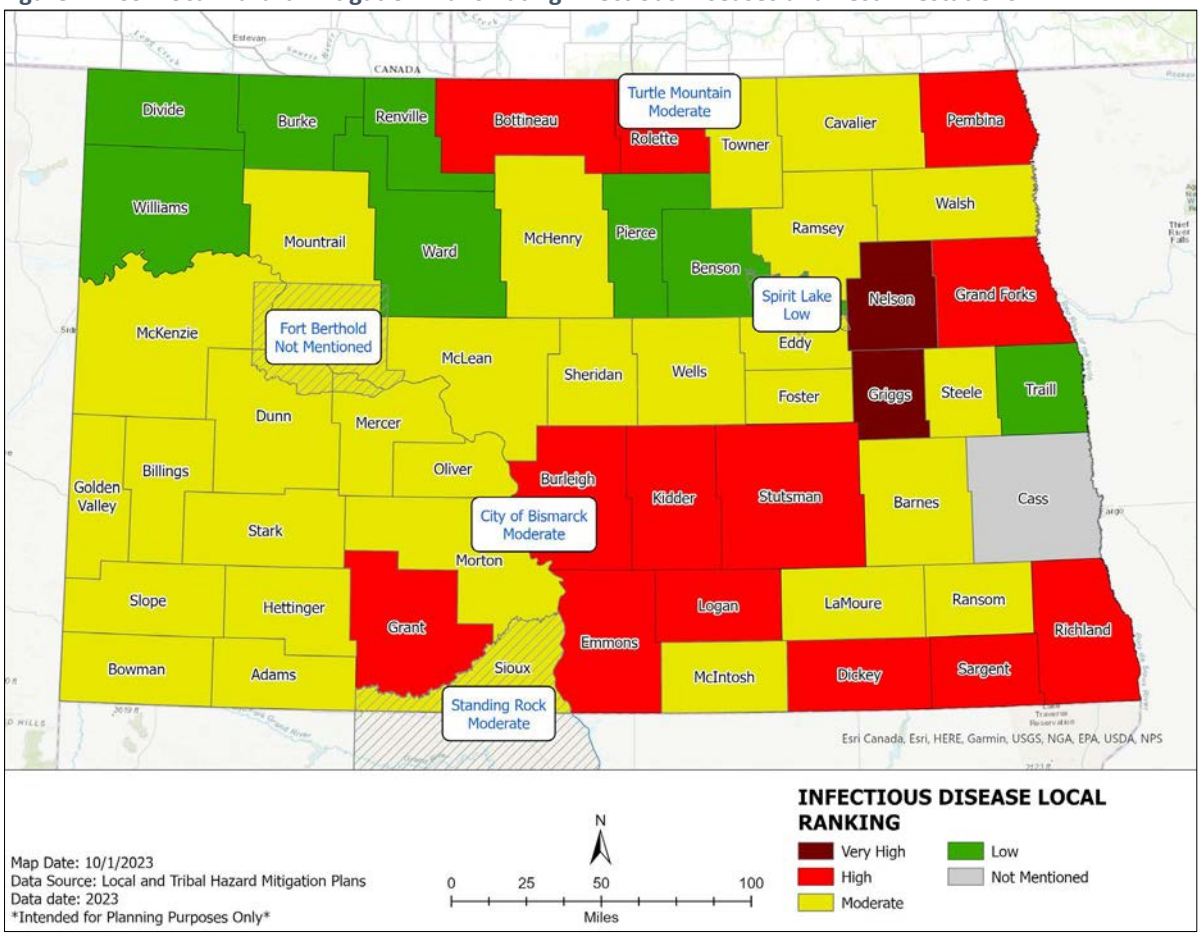
4.7.3.2 Risk Index Score

The Priority Risk Index for this plan update ranks infectious diseases and pest infestations as a moderate risk with a score of 2.9. This makes infectious diseases and pest infestations the highest moderate-risk hazard, ranking it 7th out of 15 hazards.

4.7.3.3 Jurisdictions at Risk

The evaluation of local and tribal mitigation plans shows that 56 of 58 of the adopted plans identify Infectious Diseases and Pest Infestations as a hazard impacting their jurisdiction as shown in **Figure 4.7-69**. Of all local and tribal plans that ranked hazards, 32 considered it a moderate risk and 13 considered it a high risk.

Figure 4.7-69: Local Hazard Mitigation Plans Rating Infectious Diseases and Pest Infestations



Source: Local and Tribal Mitigation Plans, 2023

4.7.4 Summary/Conclusion

The following bullets demonstrate highlights and conclusions related to infectious diseases and pest infestations.

- The COVID-19 emergency has ended, but North Dakotans will continue to contract and die from COVID-19.
- Novel human, animal, and plant diseases and invasive pests will always pose a real but incalculable threat to the state.
- Infectious diseases can cause infection and even death among the population of the state, especially among the unvaccinated.
- North Dakota allows vaccinations to be refused for personal reasons.
- Most human health threats are on the rise in the state, including food- and water-borne illness, sexually transmitted infections, and vector borne disease.
- There are consequences to society for taking measures to slow the spread of infectious disease that should be considered and mitigated as well.
- The COVID-19 pandemic exposed vulnerabilities in society, trade, and technology that can now be identified, and actions taken to mitigate the impacts of the next outbreak.
- While most animal and plant diseases are decreasing in the state, there are several threats that increase the likelihood of a substantial future outbreak, including global trade, veterinary shortages, and the presence of concentrated animal feeding operations.
- Climate change will accommodate new threats and new pests to the state over time and may increase the threat posed from existing pests.

4.7.5 Data Limitations

New and novel diseases that are unknown to humanity today could end up posing the largest threat to the state in the next five years as exemplified by the outbreak of COVID-19 in 2020. Many data sources that were used in this section relied on passive disease surveillance and, thus, underestimates actual rates of infection.

An outbreak occurring at the Dakota Women's Correctional and Rehabilitation Center could result in the need for mass evacuation and care as the facility is home to approximately 130 female inmates.

(Hettinger County Multi-Jurisdictional Hazard Mitigation Plan, 2019)

The growth of the energy industry has resulted in an influx of young workers who are generally less susceptible to disease given their age; however, the high-density living conditions experienced by many of these workers, especially those in workforce housing facilities, could make rapid disease transmission more likely.

(Mercer County Multi-Jurisdictional Hazard Mitigation Plan, 2022)

4.8 Dam Failure

4.8.1 Overview

Dam failures can result in flooding and flood damage downstream of dams. Catastrophic dam failures can occur and have in the past across the nation. Historically dam failures have been caused by flood conditions, dam construction and maintenance issues, design issues/inadequate design, earthquakes, and landslides. Dams serve many purposes including hydroelectric power generation, flood control, water supply, storage of irrigation water, fire protection, wildlife habitat, and recreation. The impacts of dam failure vary depending on the function the dam serves, the landscape, and amount of human development downstream of the dam.

4.8.1.1 Description

The National Weather Service describes dam failure as a "catastrophic event characterized by the sudden, rapid, and uncontrolled release of impounded water" (NWS, 2023). Dams are artificial barriers that impound and/or divert water. When a dam fails it suddenly releases impounded water, and that water quickly surges downstream as a fast-moving flow or wall of water which can pose a significant hazard to downstream residents, their communities, public and private property, and agricultural interests. Under normal operations dams have controlled releases of water, which can also cause flooding or damage downstream. However, our focus in this section is the potentially catastrophic impacts of an unplanned and uncontrolled release of water due to dam failure.

Figure 4.8-1: Chinook helicopter moving 5-ton pumps into place at Bourbanis Dam, 2022

Source: ND National Guard Image, 2022

Dam failures happen for numerous reasons including, but not limited to, more water than the dam can handle entering the waterway due to more rainfall than is normal for an area, intentional acts by humans aimed at causing destruction (dam sabotage), or structural failure due to construction or maintenance issues or inadequate design. Dam failures are typically caused by the following conditions:

- Flood conditions may cause water volumes to exceed spillway capacity and cause overtopping of the dam.
- Seepage related issues including piping and internal erosion of soil.
- Plugged conduits through embankment dams.
- Earthquake(s) can trigger dam movement.
- Landslides can damage a dam or reservoir.
- Inadequate maintenance and upkeep can lead to failure.
- Settlement and cracking of concrete or embankment dams.
- Structural failure of the materials used to construct the dam.
- Movement or failure of the foundation supporting the dam.

The North Dakota State Water Commission became the Department of Water Resources (ND DWR) on August 1, 2021. The North Dakota DWR administers the Dam Safety Program pursuant to the North Dakota Century Code and the North Dakota Administrative Code. The North Dakota State Engineer and DWR have the power, authority, and general jurisdiction to regulate existing dams and dam construction. Under the state's Dam Safety Program, the state's non-federally owned high and medium hazard dams are periodically inspected to identify any needs for maintenance and repairs. The program also maintains an inventory of North Dakota's dams and assists with emergency preparedness activities relating to dams.

Under North Dakota Century Code 61-03-25, Emergency Action Plans (EAPs) are required for all high hazard and medium hazard dams in the state (ND Century Code, 2023). EAPs are documents containing how a dam failure would be handled for a specific dam to help minimize the loss of life and damage to property. An EAP identifies the dam failure risks and impacts for an individual dam and specifies the course of action that should be taken should a failure occur. All owners of high and medium hazard dams in the state are responsible for developing, testing, and updating EAPs for their dams.

The majority of North Dakota's dams are more than 50 years old, according to the DWR. As dams age, the need for repairs and maintenance increases. Repairs and maintenance are the responsibility of the dam owner, but DWR has a cost-share program that helps assist with dam safety repairs and emergency planning costs. In North Dakota, most of the dams are small, privately owned dams built for livestock, irrigation, recreation, or fish and wildlife uses (DWR, 2017). However, there are also big federal dams in the state, including Garrison, Baldhill, Pipestem, and Jamestown dams which were built for generating power, water supply, power generation, and flood control purposes (DWR, 2017). There are also medium-sized dams built for flood control or recreation purposes.

According to the National Inventory of Dams (NID) there are a total of 950 federal or state regulated dams in North Dakota. The NID, first released in 1975, is maintained by the U.S. Army Corps of Engineers

and compiles information on all dams in the National Dam Safety Program; however, it is not a complete list of the dams in the state (NID, 2023). The North Dakota Hazard Mitigation 2021 Progress Report identified 3,362 known dams that year, with 49 classified as high hazard and 63 as medium hazard structures (NDDES, 2021). This hazard classification is based on the potential for loss of life and significant damage if failure occurs.

Figure 4.8-2 shows the ownership of dams in 2023 as classified by the state's Dam Safety Program (ND DWR Dam Safety, 2023). While ownership of high-hazard dams is largely federally or locally owned, most dams in the state are low hazard and privately owned.

Figure 4.8-2: Ownership of North Dakota Dams

	Hazard Potential				
Owner	High	Low	Significant	Undetermined	Total
Federal	23	258	1	13	295
Local	23	294	49	27	393
Other	0	2	0	4	6
Private	0	2,095	3	168	2,266
Public Utility	1	20	0	0	21
State	2	94	8	1	105
Unknown	0	49	0	91	140
Total	49	2,812	61	304	3,226

Source: ND DWR Dam Safety, 2023

Figure 4.8-3 shows data related to the purpose of the dams by their hazard potential. Most high-hazard dams are used for flood control, followed by recreation (ND DWR Dam Safety, 2023). According to the ND DWR Dam Safety Program (2023), most dams in the state have an unknown purpose and/or are considered to be low hazard.

Figure 4.8-3: Primary Dam Functions

	Potential Hazard				
Purpose	High	Low	Significant	Undetermined	Total
Debris Control	0	1	0	0	1
Fish & Wildlife	1	650	2	36	689
Flood Control	34	14	31	6	85
Irrigation	1	12	2	0	15
Livestock	0	372	0	5	377
Other	1	13	0	2	16
Recreation	9	68	23	1	101
Sediment Control	0	7	0	0	7
Waste Lagoon	0	2	0	1	3
Water Supply	2	7	3	0	0
Unknown	1	1,666	0	253	1,920
Total	49	2,812	61	304	3,226

Source: ND DWR Dam Safety, 2023

There are also different types of dams based on their construction methods and materials. According to the U.S. Army Corps of Engineers National Inventory of Dams there are earthen, concrete, rockfill, gravity, buttress, arch, multi-arch, masonry, stone, timber crib, and other dams (NID, 2023). In North Dakota the majority of federal or state regulated dams are earthen dams as shown in **Figure 4.8-4**.

Figure 4.8-4: Regulated Dam Types

Composition	Dams
Earth	771
Unknown	122
Other	51
Concrete	4
Arch	1
Gravity	1

Source: NID, 2023

4.8.1.2 Previous Occurrences

Engineers from the North Dakota DWR have worked with local water boards to divert catastrophic flooding by mitigating significant erosion and protecting the emergency spillways. The United States Bureau of Reclamation and the United States Army Corps of Engineers conduct training and inspections to ensure structural integrity. While there have been no occurrences of high or medium dam failure in North Dakota to date, there have been failures of low hazard dams and events where dams were damaged. The following section describes notable and recent events of dam damage in the state of North Dakota.

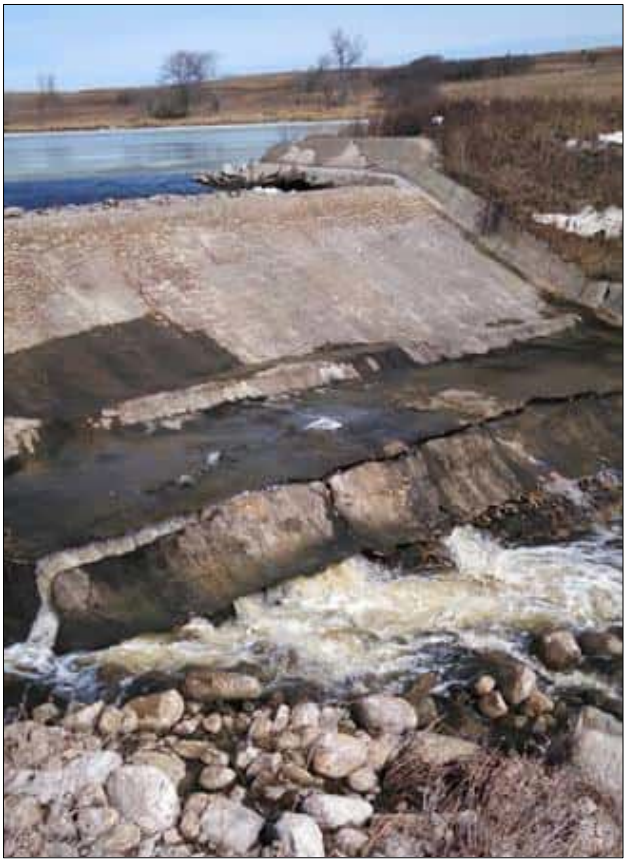
Figure 4.8-5: Blackhawk helicopters deploy 1-ton sandbags at Bourbanis Dam, 2022

Source: ND National Guard Image, 2022

- In May 2022, erosion led to sidewall failure of the Mayville Dam on the Goose River, creating a situation in which the river altered its course (Trudeau, 2022). Snowmelt, flooding, and rain contributed to elevated river levels, impacting this low head dam. Five days later, the river was back in its banks, at the cost of 2,000 tons of rock to stop erosion (Harbo, 2022). According to Harbo (2022), replacing the 100-plus-year-old recreational dam was not in the Mayville budget.
- In May 2022,12-16 inches of snowmelt was followed by 2.3 inches rain in the Tongue River Basin of far northeast ND, placing pressure on the Bourbanis Dam upstream (west) of Cavalier. A partially obstructed conduit caused long duration flows and subsequent erosion over the earthen auxiliary spillway and causing the closure of Highway 5 out of risk for failure (Nelson, 2022). Evacuation alerts for downstream residences were conducted (Nelson, 2022). The National Guard was activated, and 119 one-ton sandbags were deployed to protect the dam (Nelson, 2022) and pumps and portable pipe were brought into the site using Chinooks to lower reservoir levels.
- A private Williams County dam was decommissioned in 2021 due to its poor condition and high risk to downriver residents should

the 10-foot-by-300-foot dam fail (North Dakota DWR, 2021). According to the North Dakota DWR (2021), the state breached the embankment at the spillway, alleviating the risk of failure.

Figure 4.8-6: Damaged Tolna Spillway



Source: Triebold, NewsDakota, 2015. Reprinted with permission.

- In 2008, and again in 2015, Tolna Dam experienced damage to its spillway due to water eroding the soil underneath it, as in **Figure 4.8-6**. According to the North Dakota DWR (2015), Tolna Dam is a medium hazard dam in Nelson County.
- In the spring of 2013, a combination of rain and snowmelt runoff caused record high reservoir levels in dams across northeastern North Dakota. For example, the water level in Renwick Dam's reservoir rose to the point that more than 1,000 residents of Cavalier were forced to evacuate (ND DWR, 2017). Renwick Dam is a high hazard dam in Pembina County, ND.
- After operating the spillway for the first time in 2011, an inspection by the United States Army Corps of Engineers of the Garrison Dam Spillway revealed a design flaw when two manhole covers were lifted from the chute by the rush of waters from the opening of the spillway, allowing waters to fill the seepage area below (Springer, 2021). Such a flaw, while improbable, could lead to failure of the structure which would inundate the Bismarck-Mandan area and impact 12 downstream states (Springer, 2021). Solutions considered include a redesign of the chute, retrofitting of the manholes, and redesign of the drainage system (Springer, 2021). The final project includes a redesign of the drainage system with more armoring and overflow protection at the spillway entrance with improved weathering for the site (USACE Omaha District, 2021). According to USACE Omaha District (2021), construction is expected to be completed in 2029.
- In 2011 Burlington Dam No. 1 in Ward County came very close to failing under the stress from flooding and the potential risk to those downstream was documented by MPR News in an April 2011 article "Troubled dam still threatens North Dakota town" (MPR News, 2011). According to the North Dakota DWR (1999) it is a low hazard dam that was built in 1935.
- In 2010 the Cottonwood Creek Dam and Absaraka Dam (Swan Buffalo Detention Dam No. 12) experienced damage to their spillways due to spring runoff causing flow through their emergency spillways (Association of State Dam Safety Officials, 2023). Absaraka Dam is a medium hazard dam in Cass County and Cottonwood Creek Dam is a medium hazard dam in LaMoure County.

- Residents in the town of Kathryn have been told to evacuate more than once due to issues with the Clausen Springs Dam on Spring Creek. In April 2009, 60 residents were evacuated when auxiliary overflow led to an erosion rate of 5 feet every 10 minutes. According to the Grand Forks Herald (2009), the National Guard was called in to drop more than 20 half-ton sandbags to divert water.
- In 2009 both Cottonwood Creek Dam and Clausen Springs Dam experienced significant erosion of their emergency spillways as shown in **Figure 4.8-7** (ND DWR, 2017). Clausen Springs Dam is a high hazard dam located in Barnes County. According to NWS (2023), several other small earthen dams were nearly lost due to erosion caused by the flooding in 2009.

Figure 4.8-7: Erosion at Clausen Springs Dam, 18 April 2009

Source: Moore Engineering, 2009. Reprinted with permission.

- In 2000 the Mike Olson Dam, which is part of 44th Street NE in Grand Forks County, failed due to an extreme rainfall event and flooding along the Turtle River Basin which exceeded the capacity of the dam. According to NPDP (2023), two lives were lost when the motorists went off a washed-out section of roadbed into the flooded Turtle River, a secondary result of the failure.

The most common form of damage to high and medium hazard dams in North Dakota is damage to their auxiliary spillways. However, even low hazard dams have experienced failures, like the Mike Olson Dam identified above which caused the loss of local infrastructure which resulted in the loss of two lives.

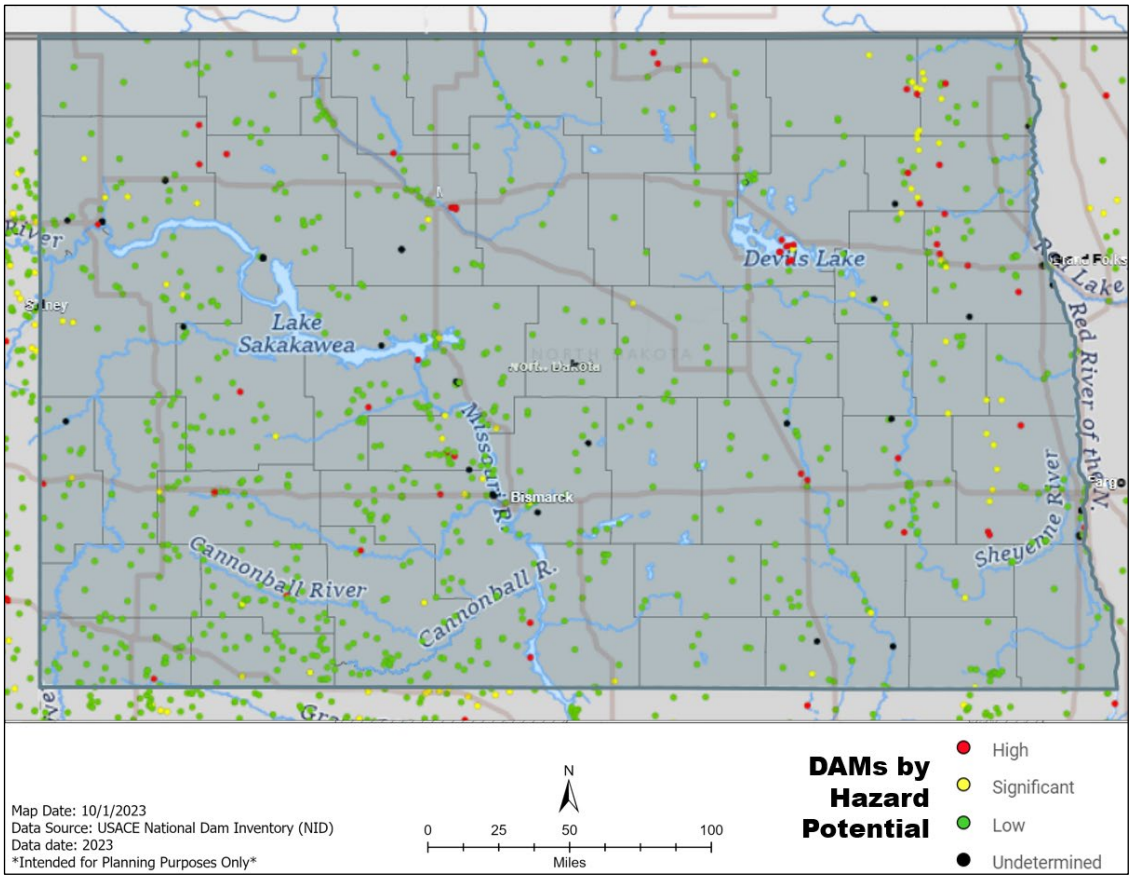
4.8.1.3 Location and Extent

The Extent (intensity or magnitude) of a Dam Failure Hazard is a combination of 1) Hazard Class, 2) Dam Condition, and 3) Likelihood of Dam Failure under the potential adverse conditions (FEMA P-1025, 2015). The first component, **Hazard Classification** of a dam, is based on the potential hazard to life and property should the dam fail. The North Dakota Administrative Code Section 89-08-01-01 (ND Admin Code, 2023) establishes the following hazard potential categories:

- **High Hazard Dams:** Dams with high-hazard potential where failure or misoperation will probably cause loss of human life. There is the potential for loss of more than a few lives if a dam in this category were to fail.
- **Medium (Significant) Hazard Dams:** Dams with medium-hazard potential where failure or misoperation results in no probable loss of human life but can cause economic loss, disruption of lifeline facilities, or can impact other concerns.
- **Low Hazard Dams:** Dams with low-hazard potential where failure or misoperation results in no probable loss of human life and low economic losses.

Large federal dams in North Dakota were built by the U.S. Army Corps of Engineers and U.S. Bureau of Reclamation across the state from the 1940s to the 1980s. They include high hazard dams like Baldhill, Garrison, Jamestown, and Pipestem dams. These dams were primarily built for flood control, power generation, irrigation, and other water supply needs (DWR, 2017). According to the National Inventory of Dams (NID, 2023) there are a total of 950 federal or state regulated dams across the state of North Dakota, as shown in **Figure 4.8-8**. It is important to note that these hazard rating categories are not indicators of the condition of the dam or its probability of failure, only the potential impacts dam failure could have on lives and property.

Figure 4.8-8: Federal or State Regulated Dams in North Dakota, by Hazard Potential



Source: NID, 2023

The North Dakota Dam Safety Standards (NDDWR Reg_05.2024a, 2024) requires that medium and high hazard dams undergo construction inspections and periodic maintenance inspections to determine the **Dam Condition** on a recurrent basis. According to Appendix B, of the ND Dam Safety Standards, the *risk* or **Likelihood of Dam Failure** is evaluated by engineering evaluations where failure *risk* is a function of:

i) the probability of a particular load (i.e.. flood, earthquake, etc.),
ii) the probability and type of system failure based on the load, and
iii) the consequences of each potential type of failure.

FEMA's Federal Guidelines for Dam Safety Risk Management (FEMA P-1025, 2015) identifies the risk of dam failure in similar fashion and provides rating categories that indicate the condition of the dam, a level of confidence for risk of failure, and potential actions that should be immediately implemented.

The assessments of dam *condition* and *likelihood of failure* may need to be assessed in conjunction with ongoing heavy rain or flooding situations. When assessed, federal dams or structures are assigned a rating ranging from one to five, where one is the highest risk rating, or the most likely to experience a failure in its current condition, and five is the lowest risk rating, or the least likely to experience a failure in its current condition. The Joint Federal Risk Categories (FEMA P-1025, Table 1, p. 30) are displayed in **Figure 4.7-9**, below. Each level of increasing urgency has a set of prescribed actions to assure that operators, emergency personnel, and first responders are acting to assure minimal loss of human life.

Figure 4.8-9: Joint Federal Risk Rating Categories

Urgency of action	Characteristics and considerations	Potential actions
I – VERY HIGH URGENCY	CRITICALLY NEAR FAILURE: There is direct evidence that failure is in progress, and the dam is almost certain to fail during normal operations if action is not taken quickly. OR EXTREMELY HIGH RISK: Combination of life or economic consequences and likelihood of failure is very high with high confidence.	• Take immediate action to avoid failure. Communicate findings to potentially affected parties. • Implement IRRMs. • Ensure that the emergency action plan is current and functionally tested. • Conduct heightened monitoring and evaluation. Expedite investigations and actions to support long-term risk reduction. • Initiate intensive management and situation reports.
II - HIGH URGENCY	RISK IS HIGH WITH HIGH CONFIDENCE, OR IT IS VERY HIGH WITH LOW TO MODERATE CONFIDENCE: The likelihood of failure from one of these occurrences, prior to taking some action, is too high to delay action.	• Implement IRRMs. • Ensure that the emergency action plan is current and functionally tested. • Give high priority to heightened monitoring and evaluation. Expedite investigations and actions to support long-term risk reduction. • Expedite confirmation of classification.
III - MODERATE URGENCY	MODERATE TO HIGH RISK: Confidence in the risk estimates is generally at least moderate, but can include facilities with low confidence if there is a reasonable chance that risk estimates will be confirmed or potentially increase with further study.	• Implement IRRMs. • Ensure that the emergency action plan is current and functionally tested. • Conduct heightened monitoring and evaluation. Prioritize investigations and actions to support long-term risk reduction. • Prioritize confirmation of classification as appropriate.
IV – LOW TO MODERATE URGENCY	LOW TO MODERATE RISK: The risks are low to moderate with at least moderate confidence, or the risks are low with low confidence, and there is a potential for the risks to increase with further study.	• Ensure that routine risk management measures are in place. • Determine whether action can wait until after the next periodic review. • Before the next periodic review, take appropriate interim measures and schedule other actions as appropriate. • Give normal priority to investigations to validate classification, but do not plan for risk reduction measures at this time.
V – NO URGENCY	LOW RISK: The risks are low and are unlikely to change with additional investigations or studies.	• Continue routine dam safety risk management activities and normal operations and maintenance.

Source: Federal Guidelines for Dam Safety Risk Management (FEMA P-1025), 2015

Successful risk analysis, assessment, management, and communication is key to dam safety management. However, proactive planning for impact and response is still necessary. Extent planning for a dam failure incident is conducted using inundation mapping. The USGS works with the NWS, USACE, and FEMA to offer their USGS Flood Inundation Mapping (FIM) Program.

The FIM Program has two main functions: to partner with local communities to assist with the development and validation of flood inundation map libraries and to provide online access to flood inundation maps along with real-time streamflow data, flood forecasts, and potential loss estimates (USGS, 2023). These local inundation maps can be used to generate "what if" scenarios, which could help citizens better understand dam failure risk as it pertains to their community and local elected officials prioritize and make mitigation investments.

White Rock Dam in northeast South Dakota and Orwell, Lower Red Lake, and the Lake Bronson Dams in west-northwest Minnesota are dams within the Red River Basin which are located in other states but could impact North Dakotans directly by their releases. And if they failed, could send a surge downriver that would further put the soundness of North Dakota dams at risk. Risk from dam failure even crosses international borders on the Pembina River, where Canadian dams could fail and risk the integrity of downstream North Dakota dams or the property and lives of North Dakotans. Fort Peck Dam in Montana could also impact the state including the City of Williston (Black, 2011).

Figure 4.8-10 provides an overview of the spatial extent on resources for dam failure. A dam failure that occurred without notice has a different spatial extent versus an anticipated dam failure. An EAP can be executed for the necessary measures to protect lives and property including evacuation operations. If dam failure occurs without notice, then the effects upon the resources could be significant and detrimental.

Figure 4.8-10: Spatial Extent for Dam Failure

Resource	Extent
Public	Regional
First Responders	Regional
Delivery of Service and Continuity of Operations	Regional
Property, Facilities, and Infrastructure	Regional
Environment	Regional
State Economy	Regional
Public Confidence in the State's Governance	Regional

4.8.1.4 Probability

The National Performance of Dams Program (NPDP) analyzed the probability of dam failure in the United States in a 2018 Report. The earliest recorded dam failure occurred in 1848 in Bancroft, Massachusetts (NPDP, 2018). At that time, there were no known dams in North Dakota, with the oldest dam still in existence being the Fort Ransom/Walker Dam, completed in 1881 near Fort Ransom (NID, 2023). Most dams were not built in the United States at that time, with 1945-2000 serving as the era or major dam construction in the United States (NPDP, 2018). This period is also the most productive era of dam building in North Dakota with 2,073 dams built in that period (NDDSP, 2023).

North Dakota also had a busy inter-war period with 366 dams constructed between 1920-1940 as shown in **Figure 4.8-11** (NDDSP, 2023). The average age of a dam in the National Inventory of Dams in North Dakota is 57 years old (NID, 2023). The riskiest years for dams are in their first 10 years of operation when the reservoir is filling with water and 12 percent fail during that first decade of operation (NPDP, 2018). The next critical years are when dams are past their design life. More than 10 percent of dam failures occur in dams that are 100 years old or more. According to NDDSP (2023), at least 51 dams in North Dakota are more than 100 years old as of 2023.

Figure 4.8-11: Built Year of North Dakota Dams, 2021

Year Built	Dams
1800s	5
1900-1920	15
1921-1940	209
1941-1960	73
1961-1980	226
1981-2000	191
2001-present	90
Unknown	142

Source: NID, 2023

Dams have failed in all 50 states (NPDP, 2018). Since 1980 when dam safety became a focus and dams and their failures were monitored, there have been an average of 24 failures per year in the United States between 1980 and 2017 (NPDP, 2018). According to NDPD (2018), based on this rate, North Dakota should expect a 0.24 chance of dam failure in any given year, or otherwise stated, it should anticipate a dam failure before the next plan update.

Yet in 96 percent of dam failures, there is no loss of life (NPDP, 2018). **Figure 4.8-12** shows the relative hazard classifications and conditions of the 950 regulated federal and state dams. Just 54 (5.7 percent) of North Dakota dams are considered to be a High Hazard Potential Dam (HHPDs) (NID, 2023), meaning their failure would likely lead to the loss of human life downstream, and of these 10 were considered in poor condition. According to NDPD (2019), if every dam in the state had an equal chance of failure, the likelihood of a dam failure resulting in the loss of life would be around a 1 percent annual chance.

Figure 4.8-12: North Dakota Regulated Dams by Hazard Classification and Condition, 2023

Potential Hazard	Dams	Condition		
		Poor	Fair/Satisfactory	Unavailable/Not Rated
High	54	10	18	26
Significant	65	0	0	65
Low	787	23	49	714
Undetermined	45	0	0	45
Total	950	33	67	850

Source: NID, 2023

The DWR Dam Safety Program staff inspects non-federally owned high hazard and significant/medium hazard dams on a rotational basis, with additional inspections conducted as needed or as requested (NDDWR, 2023). Federal agencies follow a similar practice for federally owned dams (FEMA P-93, 2023). The U.S. Army Corps of Engineers provides an abbreviated explanation of the hazard potential classification and overall dam condition assessment information included in the National Inventory of Dams Data Dictionary (2023). In short, a *Satisfactory Rating* means that no existing or potential dam safety deficiencies have been recognized. A *Fair Rating* means that no existing dam safety deficiencies are recognized for normal operating conditions. A *Poor Rating* means that a dam safety deficiency is recognized for normal operating conditions which may realistically occur. An *Unsatisfactory Rating* means that a dam safety deficiency is recognized that requires immediate or emergency remedial action for problem resolution.

The NID also monitors the condition of known dams. Of the 33 dams in poor condition, 10 of them are HHPDs (NID, 2023). **Figure 4.8-13** shows the 12 dam incidents that the state has experienced since the Association of Dam Safety Officials (ASDSO) began to track dam incidents in 2010, after the failure of the Mike Olson Dam and subsequent loss of life. None has resulted in failure or fatality, but two resulted in the evacuation of a total of 1,500 people, and the reservoir behind the Tolna Dam had to be drained until repairs were made (ASDSO, 2023). According to ASDSO (2023), most incidents occurred on dams without a condition rating.

Figure 4.8-13: North Dakota Dam Incidents since 2010

Dam Name	Class	Condition	Date	Driver	Mechanism
CLAUSEN SPRINGS	High	Poor	4/8/2011	Hydrologic/flooding	High Reservoir Level
BURLINGTON #1	Low	NR	4/11/2011	Hydrologic/flooding	Piping
BOURBANIS	Significant	NR	5/21/2013	Hydrologic/flooding	High Reservoir Level
OLSON	High	Poor	5/21/2013	Hydrologic/flooding	High Reservoir Level
RENWICK	High	Satisfactory	5/21/2013	Hydrologic/flooding	High Reservoir Level
TOLNA NO. 1	Significant	NR	3/13/2015	Deterioration	Spillway Chute Failure
DAUB	Significant	NR	4/10/2018	Seepage/Erosion	Erosion
ELM RIVER NO. 1	Significant	NR	4/25/2018	Hydrologic/flooding	High Reservoir Level
SWAN BUFFALO DET #12	Significant	NR	4/3/2019	Hydrologic/flooding	High Reservoir Level
COTTONWOOD CREEK	Significant	NR	4/4/2019	Hydrologic/flooding	High Reservoir Level
DAVIS FISH	Low	NR	4/23/2019	Seepage/ Erosion	Spillway Pipe Failure
SYKESTON	Significant	NR	9/21/2019	Hydrologic/flooding	High Reservoir Level

Source: Association of State Dam Safety Officials, 2023

4.8.1.5 Warning Time and Duration

Most large or high-hazard dams have some instrumentation that gauge changes in dam behavior and an assigned person to initiate the EAP if monitors indicate a change in condition (Mauney, 2020). The U.S. Bureau of Reclamation and the U. S. Army Corps of Engineers conduct real time monitoring, conduct frequent exercises, and ensure scheduled maintenance. Mass notification systems that send text messages to targeted audiences have been used in recent years successfully to share information about dam failure in North Carolina in 2017 by uploading inundation zones into the system (FEMA, 2018). In-person notification is often conducted by first responders, but having information for the responders to pass out to residents about shelter locations and rules can help get information out clearly (FEMA, 2018). According to Mauney (2020), timely public notification has historically made a difference in the number of fatalities in events.

4.8.2 Consequence and Vulnerability Loss Analysis

Consequences and vulnerabilities are defined as follows in the context of this resource. A consequence is the "degree of debilitating impact that would be caused by the incapacity or destruction of critical infrastructure or a critical function." Consequences can be tangible impacts to buildings or systems or intangible impacts on processes, business, or reputation. Consequences include debilitating impacts, such as the loss of critical functions, data, or public confidence. According to FEMA Emergency Management Institute (2023), it also includes cascading effects that may have an effect on functionality of critical services such as the loss of service of a utility or communications.

Vulnerability is "susceptibility to physical injury, harm, damage, or economic loss." It considers the extent of injury and damage that may result from a hazard event of a given intensity in a given area. According to FEMA Emergency Management Institute (2023), this may be a geographic, social, or economic feature that makes harm from a hazard more likely or more intense.

4.8.2.1 Human Loss

Historically, North Dakota has lost two lives during past dam failures. A 2000 dam failure in Grand Forks County took two lives when the Mike Olson Dam, which is part of 44th Street NE, failed after 12 inches of localized precipitation exceeded the capacity of the dam (NPDP, 2023). Two motorists went over the road unaware of the failure (NPDP, 2023). North Dakota has thus far avoided a large-fatality incident; however, regionally there have been significant-fatality events from dam failure.

- South Dakota lost Rapid City residents in 1972 when the Canyon Lake Dam became clogged with debris, breaching the 1938 Works Progress Administration structure and sent a 50,000 cubic feet per second surge toward downtown Rapid City before sirens could be sounded (ASDSO, 2023). Estimated losses were as high as 238 lives, and $160 million in damages. An example of the loss is shown in **Figure 4.8-14**. According to ASDSO (2023), the response included converting much of the floodway into open space to reduce future losses.

Figure 4.8-14: House Dislodged from Foundation from Canyon Lake Dam Failure, 1972

Source: Bureau of Land Reclamation, 1972

- Montana experienced a double dam failure when the Swift and Two Medicine Dams (**Figure 4.8-15**) failed in 1964 after heavy April and May snowfall and a large June storm bringing over a foot of precipitation that overwhelmed the two dams (Mauney, 2020). The area of inundation covered nearly 20 percent of the state's land mass. The Swift Dam failed without warning, killing 19 residents of the Blackfeet Indian Reservation (Mauney, 2020). The failure of the Swift Dam put authorities on alert, which allowed them to give warning to downstream residents of the Two Medicine Dam. When that dam failed 8 hours after the Swift Dam, eight deaths indirectly resulted when a bus stalled in the downstream river and only about half of the passengers were rescued. According to Mauney (2020), both dams were restored and are currently in service.

Figure 4.8-15: Two Medicine Dam after failure, Montana, 1964

Source: Bureau of Land Reclamation, 1964

Most of North Dakota's 950 NID-identified dams, even if failing without warning, do not have the reservoir capacity to take any life or cause any significant damage; however, several of the HHPDs have identified flaws and represent vulnerabilities to downstream residents.

Pipestem Dam had increasing concerns for potential erosion issues that put residents along the James River at risk during flood season (Ova, 2023). According to Ova (2023), beginning in 2023, the U.S. Army Corps of Engineers began a $200 million rehabilitation project on the dam to be completed in 2025 to repair past erosion scours, armor the spillway and improve the spillways terminus.

Heart Butte Dam in Grant County was authorized in 1944 in response to flooding in Mandan and years of interest in irrigation use (Simonds, 1996). In 2009, it was discovered that the drain that allows Lake Tschida, a reservoir located behind the Heart Butte Dam, to release into Heart River was not draining at a rate that would allow it to keep up with snow melt resulting in the flooding of eight mobile homes and

the Heart Butte Association concession trailer, as well as damage to boats, docks, and jet skis (Donovan, 2009). A second heavy rain event flooded 22 trailers (Donovan, 2009). Mobile homes are typically lost after flooding. North Dakota has 14 communities that have 100 percent of their housing units as mobile homes, and 280 that have at least 1 in 5 housing units of this type. For a list of mobile homes in the state, see Appendix D.8. There are a total of 61 communities in the state that are downstream of a dam and at risk for inundation as shown in Appendix E.8.3. Communities such as St. John, Dunn Center, and Fort Yates are examples of communities that appear in both lists and may face housing challenges during recovery from a dam failure.

Fort Peck Dam, in Montana is upriver from Williston, and has the city in its inundation area (Black, 2011). It actually did fail before, in 1938 during construction, slope failure upstream collapsed into the future reservoir as the workforce was constructing the final 20 feet of the dam's structure (Ferguson, 2020). Eight men perished, and 34 were injured; six bodies were never found and remain buried inside the dam (Ferguson, 2020). The 1,700-foot-wide mass contained more than five million cubic yards of earthen material (Ferguson, 2020). As a result, the method to fill – hydraulic fill, which is essentially mud, was never used again (Ferguson, 2020). Once completed, the 21,000-foot-long, 250-foot-tall Fort Peck Dam serves as the first large barrier along the Missouri River, with its reservoir holding the equivalent of one full year's flow of the river in its banks (Bush, 2017). The surge sent from the Fort Peck Dam Failure also could give enough force to damage downstream dams (Bush, 2017). According to Brown (2012), after the 2011 floods in the Missouri system, the U.S. Army Corps of Engineers requested $225 million to repair Fort Peck Dam; it received $46 million.

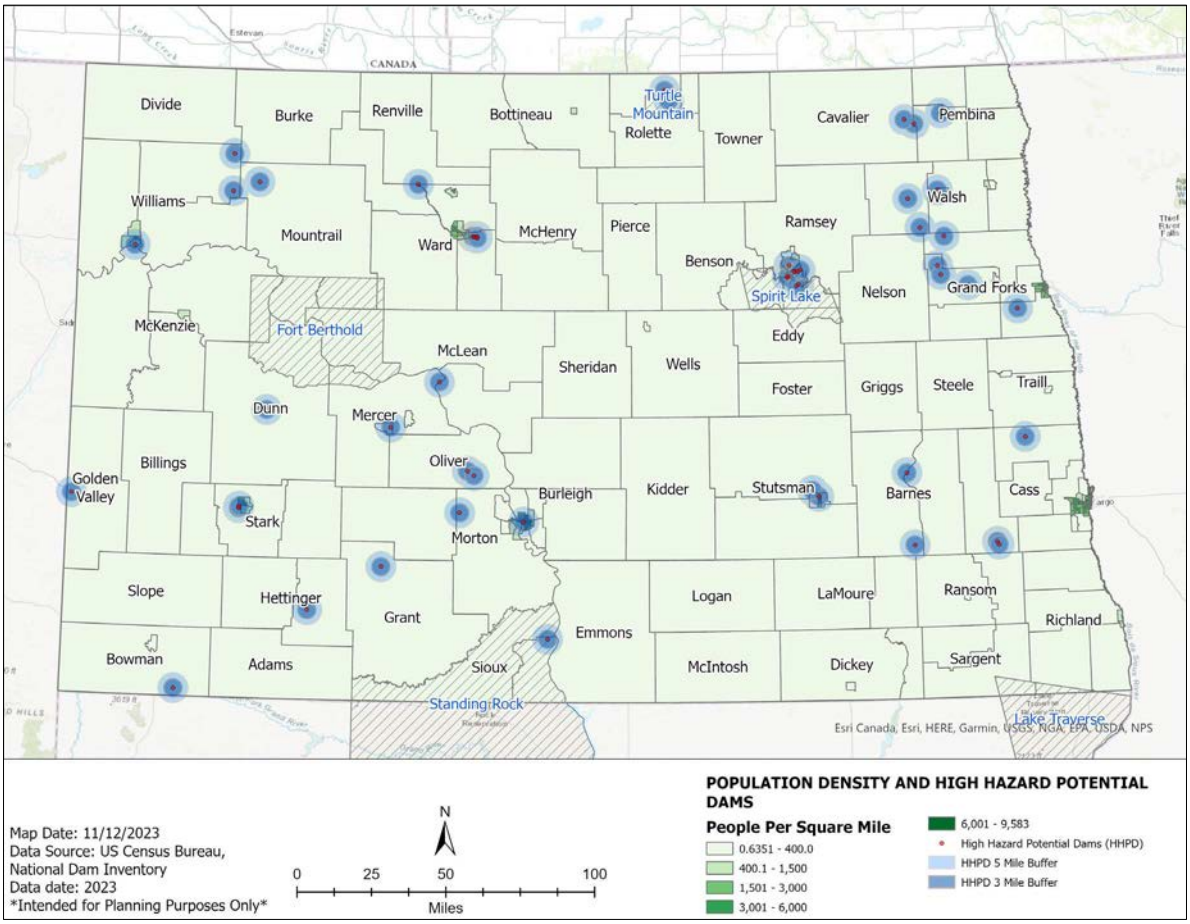
Beyond the Fort Peck Dam in Montana, there are additional dams in neighboring jurisdictions that can impact North Dakota. The Box Elder Dam in Plentywood, Montana is a flood control dam near the North Dakota border that holds 6,378 acre-feet in its reservoir (NID, 2023). The Souris River winds through Saskatchewan, Manitoba, and North Dakota. The Rafferty Dam, Grant Devine and Boundary Dam in Saskatchewan are all upriver of North Dakota and could impact the state's residents and property in the event of a failure (International Souris River Study Board, 2023). The Red River can be impacted by failures of two dams on the state line. Lake Traverse on the Minnesota-South Dakota line holds 95,500 acre-feet, and the Fargo-Moorhead Diversion can hold 512,000 acre-feet of water (NID, 2023). According to NID (2023), both Minnesota dams are considered high-hazard dams.

Discussed in the previous occurrences section, the Garrison Dam spillway is undergoing drainage system repairs. Its reservoir, Lake Sakakawea, is the third largest man-made lake in the United States at 178 miles long, with over 1,500 miles of shoreline (Greenwald, 2021). The event of a Garrison Dam Failure, while low in probability, would have major consequences for Bismarck, the state, and neighboring states. Dam failure would also have severe impacts to the city of Bismarck, including to several public schools, Water Treatment Plant, Wastewater Treatment Plant, Police Department, South Fire Station, Airport, Northern Plains Commerce Centre, Event Center, and two railroads that are within the mapped inundation area for dam. Dam failure would also inundate Stanton and extreme flooding of Hazen and all lands between these towns and south of Stanton. Approximately 35 square miles of land in Mercer County would be flooded by a Garrison Dam failure (Mercer 2022). According to Greenwald (2021), if the dam failed, flooding would also occur in 12 states from North Dakota to the Gulf of Mexico.

Figure 4.8-16 and **Figure 4.8-17** show data related to population density (U.S. Census Bureau, 2023) and High Hazard Potential Dams (NID, 2023).

Figure 4.8-16 shows the population density with 3- and 5-mile buffers from HHPDs. Within three miles of HHPDs are census tract populations that total 58,203 people. Within five miles are 28 census tracts that contain 115,003 people.

Figure 4.8-16: Population Density near High Hazard Potential Dams



Source: NID, 2023; ACS, 2023

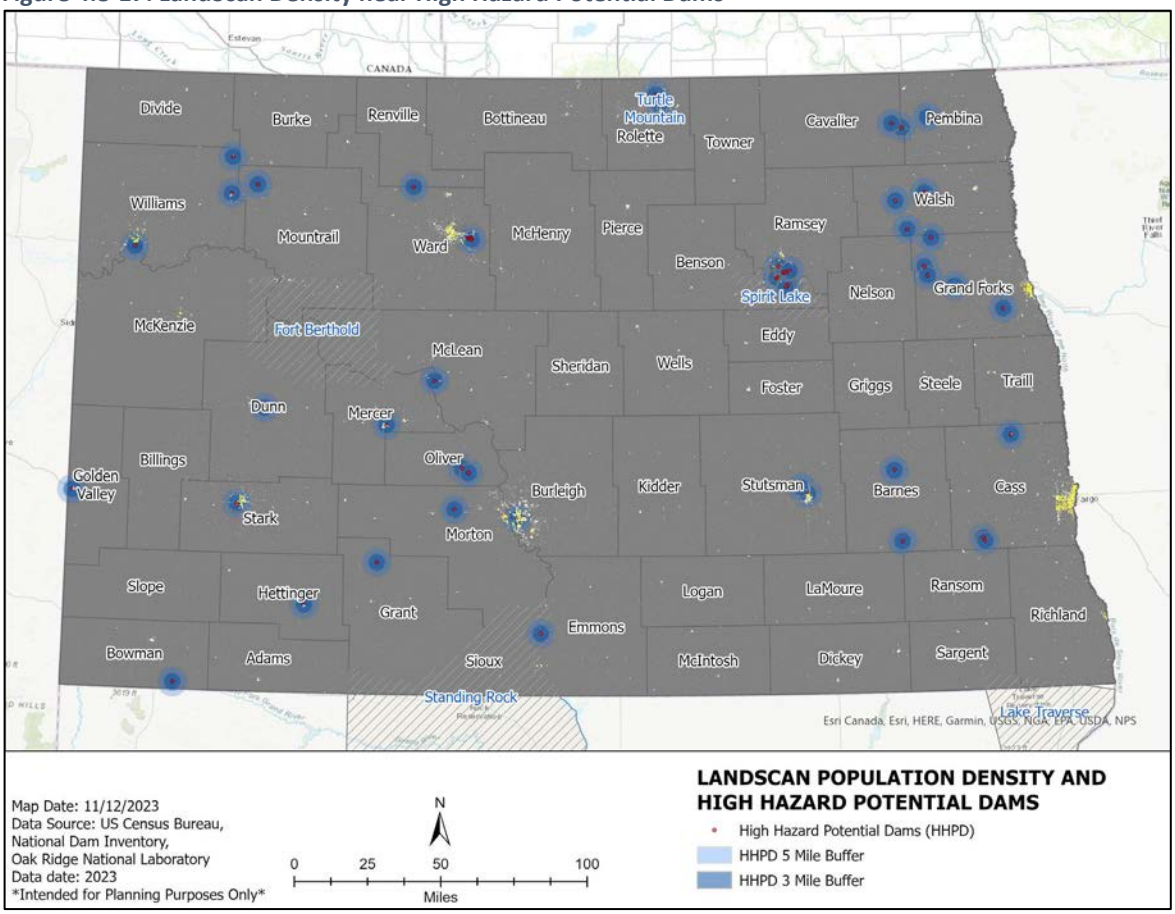
Figure 4.8-17 shows the same HHPD and buffers (NID, 2023) with the LandScan data (Oak Ridge National Laboratory, 2023) that shows a better view of concentrated populations in rural areas and vulnerable populations. The following communities are within three miles of a HHPD:

- City of Dickinson in Stark County for the Dickenson and Queen City Dams.
- City of Bismarck, in Burleigh County.
- City of Jamestown, within Stutsman County for the Jamestown Dam.
- City of Hunter, in Cass County, is within the 3-mile buffer of the Hunter Dam.

Two additional communities are within five miles of a HHPD:

- City of Mandan in Morton County for the Jackman Coulee Dam.
- City of Devils Lake in Ramsey County for the Acorn Ridge Dam.

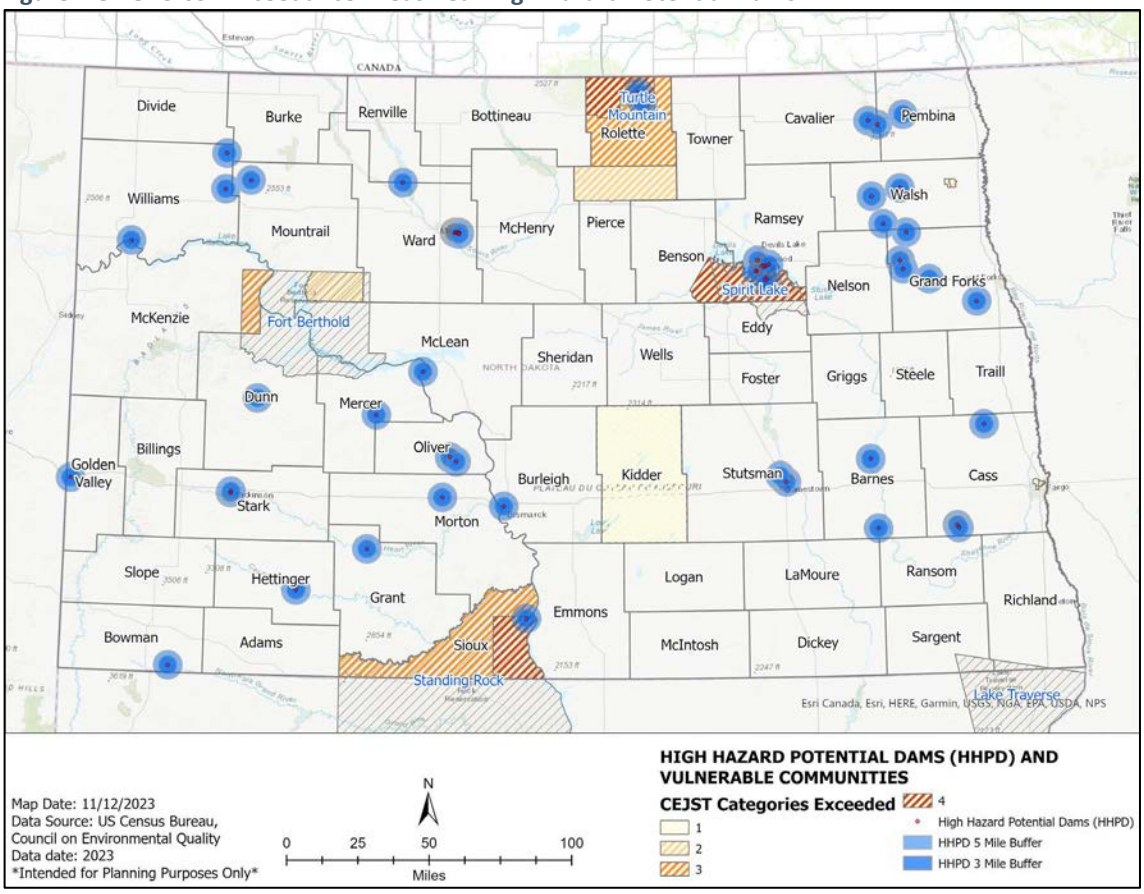
Figure 4.8-17: LandScan Density near High Hazard Potential Dams



Source: NID, 2023; Oak Ridge Laboratories, 2023

Figure 4.8-18 shows CEJST Exceedance areas (US Council on Environmental Quality, 2023) as they relate to HHPDs (NID, 2023). Areas on the Spirit Lake Nation, Turtle Mountain Nation, and the Standing Rock

Figure 4.8-18: CEJST Exceedance Areas near High Hazard Potential Dams



Source: NID, 2023; Council on Environmental Quality, 2023

Sioux Nation are near HHPDS. People and governments in this area may be less capable of easily recovering from the impacts of dam failure without seeking state and federal resources. These areas represent populations where social vulnerability and environmental burdens are high and where there may need to be local, tribal and state resources along with additional outreach to help residents in the area evacuate safely and recover from floods caused by dam failure. HHPDs near Turtle Mountain, Spirit Lake and the Standing Rock Sioux Reservation represent areas where there may need to be additional planning for evacuation and recovery to assist tribal residents who may have fewer resources available. These areas also represent zones where additional FEMA assistance may be available to aid in the development of projects for FEMA hazard mitigation programs.

Mobile homes can be lost or pushed off their foundations with very little water and would likely be lost in the event of a dam failure. There are six communities in the state that are vulnerable to failure and have more than 200 mobile homes: Bismarck, Minot, Mandan, Jamestown, Williston, and Devils Lake.

Other communities have specific risk due to the geography or local capacity. In Stutsman County (2021), Jamestown sits at risk from both the Jamestown and Pipestem Dams. The Pipestem Dam is undergoing

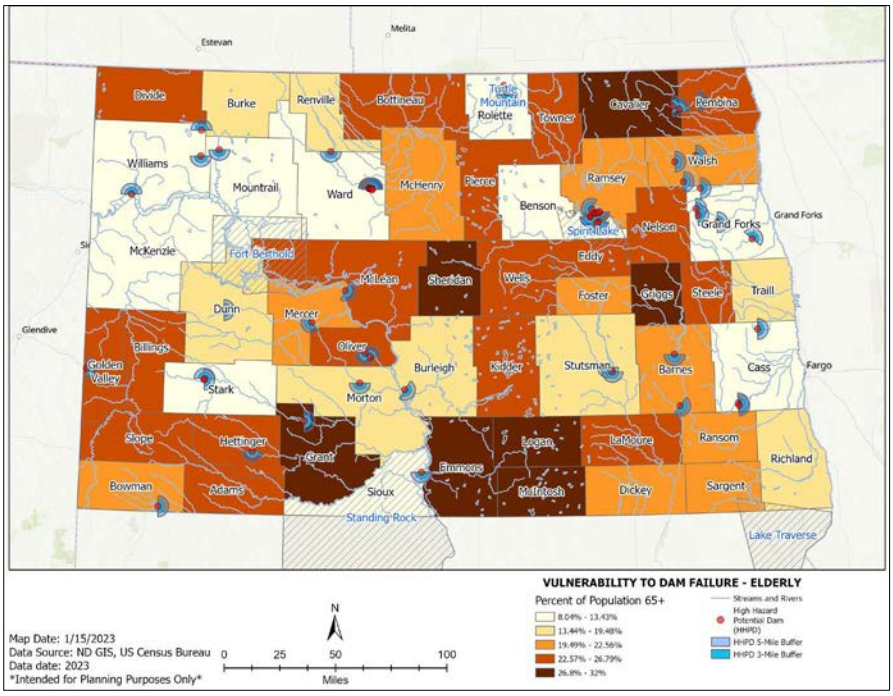
rehabilitation, and the Jamestown Dam lacks an adequate spillway. Similarly, in Morton County (2020) downtown Mandan is in the inundation zone of the Heart Butte and Garrison Dams, which have each had damages that needed repairs in recent years. Many dams have inundation zones in rural areas where there is no local land use control, and where there are not EAPs or known inundation zones.

Figure 4.8-19, **Figure 4.8-20**, and **Figure 4.8-21** show the relationship between HHPDs and elderly residents, nursing homes and disability, respectively.

Figure 4.8-19. The community at risk with the highest median ages are in Enderlin in Cass County (77), and Adams Township in Walsh County that has a median age of 59.5. Minot, Bismarck, Williston, Mandan, and Jamestown each have more than 200 households where the householder lives alone and is over 65 years of age (ACS, 2023).

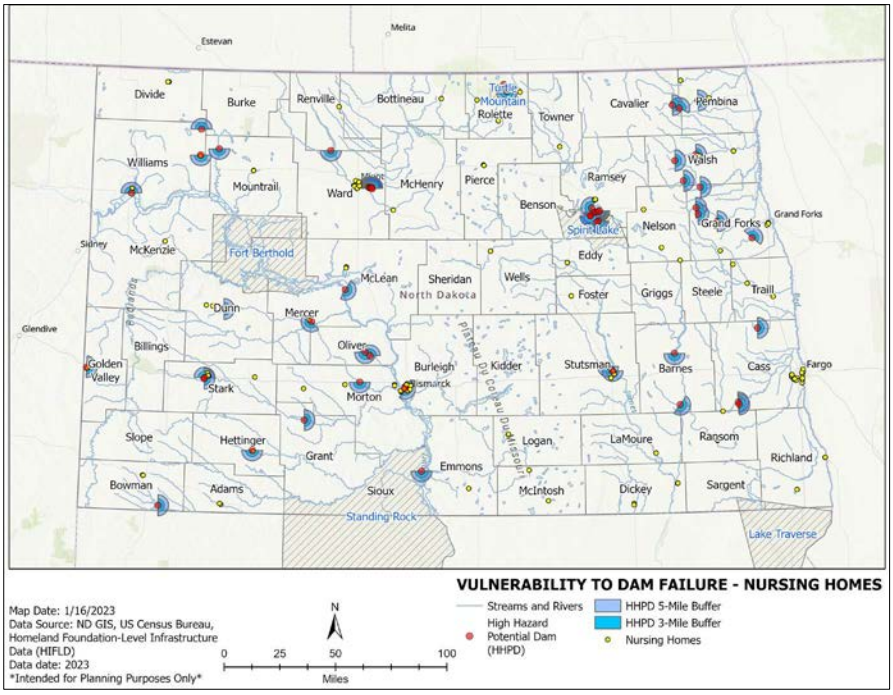
Figure 4.8-20. There are 32 nursing homes within five miles downstream of a HHPD with 25 of them within three miles (HIFLD, 2023). Within 3 miles there are 1,813 nursing home residents that will likely need extra time and assistance to evacuate in the event of a failure. An additional 485 residents live within five miles. Burleigh (7), Stark (6) and Stutsman (5) have the most at-risk residents in nursing homes.

Figure 4.8-19: Elderly Population and Dam Failure



Source: NDGIS, 2023; NID, 2023; ACS, 2023

Figure 4.8-20: Nursing Homes and High Hazard Potential Dam Failure



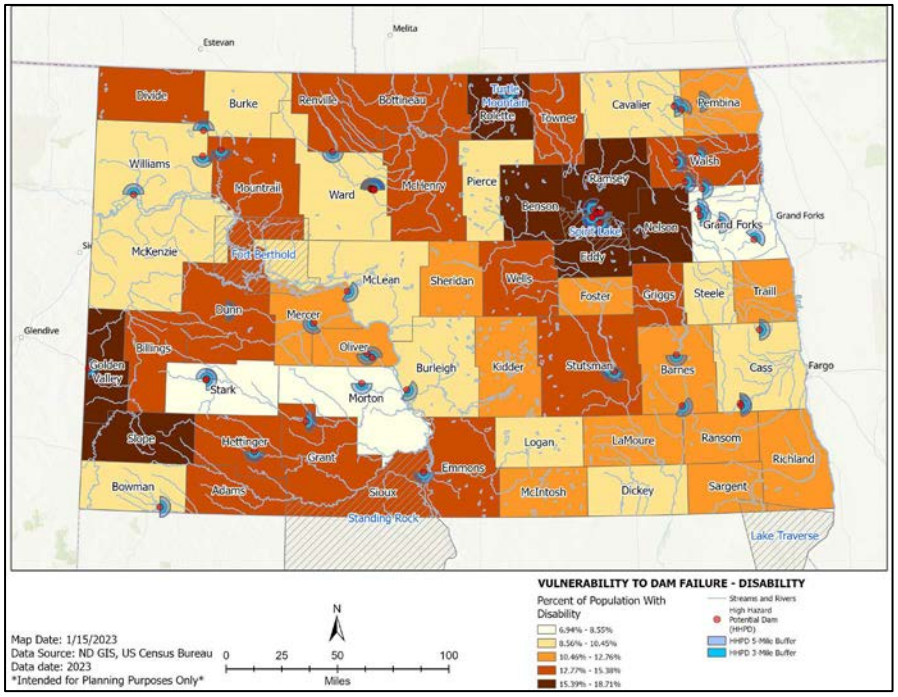
Source: NDGIS, 2023; NID, 2023; HILFD, 2023

Figure 4.8-21. Bismarck, Minot, Jamestown, Williston, Mandan, and Devils Lake each have more than 1,500 disabled residents (ACS, 2023). Each of these vulnerable populations may need more assistance understanding and responding to evacuation orders. Nursing facilities may need assistance from the state to find appropriate locations for residents.

Figure 4.8-22. Residents who may struggle to understand evacuation orders due to lack of English proficiency are shown here. The city of Kathryn in Barnes County has the highest rate of households who lack English proficiency at 8.8 percent (ACS, 2023) and is the only community downstream of an HHPD with more than 5 percent.

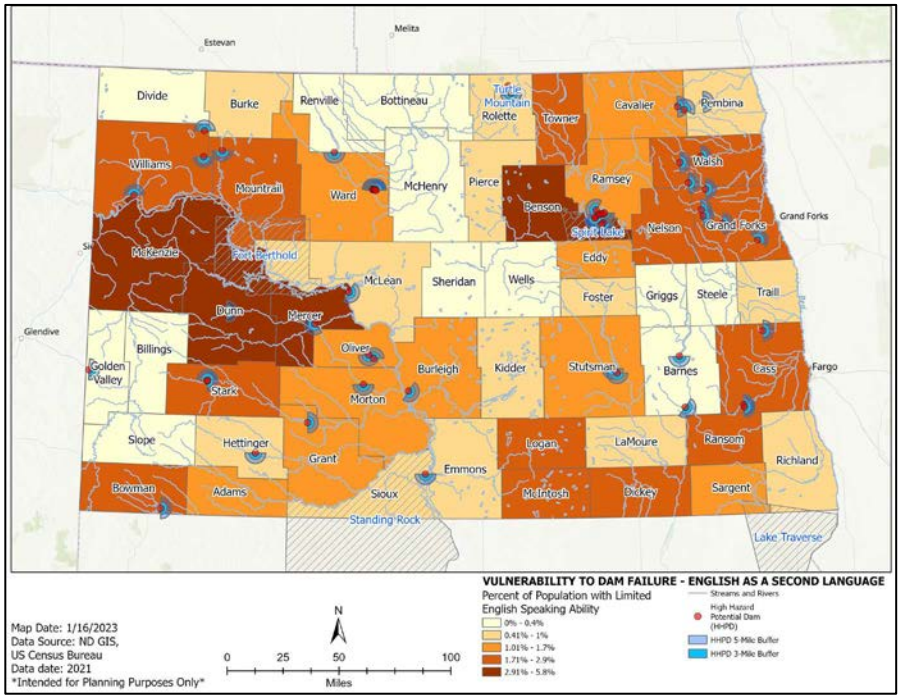
Residents without access to a vehicle may not be capable of evacuating without assistance. Though not shown in these graphics, Burlington Township (Ward) has the highest rate of workers without access to a vehicle among communities downstream from dams and is the only community with more than a third of residents

Figure 4.8-21: Disabled Residents and High Hazard Potential Dam Failure



Source: NDGIS, 2023; NID, 2023; ACS, 2023

Figure 4.8-22: Households With Low English Proficiency and High Hazard Dam Failure Potential



Source: NDGIS, 2023; NID, 2023; ACS, 2023

without access to a vehicle, with 34.1 percent of households lacking access. Local or state resources may need to be deployed in the event of a dam failure at Clausen Springs Dam (Barnes County) in order to assist residents with evacuation.

4.8.2.2 First Responders

First responders' role in dam failure is typically outlined in the EAP for each dam (ASDSO, 2023). The EAP should include information about what responders will be alerted in the event of an incident and what areas will be inundated (ASDSO, 2023). According to the ASDSO (2023), among the roles for first responders in these plans are public warning, evacuation, sheltering and rescue and recover.

Dam failures would also impact first responders. High floodwaters caused by dam failure would make it difficult to rescue individuals in inundation zones. Rapidly moving water would also put first responders' lives in jeopardy during rescue operations.

4.8.2.3 Environmental, Natural, and Cultural Resources

Dams are responsible for shaping and creating many of the recreational waterways that North Dakotans enjoy. Lake Sakakawea, Lake Tschida, Pipestem Lake, Lake Ashtabula, and Beaver Lake are examples of lakes that are actually reservoirs for dams and are used recreationally (North Dakota Department of Tourism, 2023). Reservoirs can also serve as valuable wildlife refuges and stops for migratory birds, providing environmental benefits.

Many areas of cultural significance lie along the banks of rivers with dams, and these resources would be lost in the event of failure. Along the Missouri River alone, the Lewis and Clark Trail and its many features, including the Sitting Bull Burial Site and Visitor Center, On-A-Slant Indian Village, Double Ditch Indian Village Historic Site and Fort Mandan, would be lost- from a Garrison Dam failure.

Many historic and modern walking and recreational trails lie along riverbanks that would be at risk from dam failure. Along the Red River, the Chahinkapa recreation area in Wahpeton, Fort Abercrombie, Iwen Bike Trails, Oak Grove Park, Trollwood Park and several cemeteries could be destroyed by a sudden release of Lake Traverse.

Many of North Dakota's resources along rivers are natural in nature, and dam failure would be devastating to riparian habitats and wetland vegetation. The surge from a dam failure event would damage many of the trees along banks that slow erosion.

4.8.2.4 Property, Facilities, and Infrastructure

In the event of a dam failure, the dam would be among the first infrastructure lost. Dams often serve as more than barriers for water that form recreational lakes. According to USACE Omaha (2023), the Garrison Dam includes five hydroelectric turbines that generate an annual average of 2.6 million megawatt hours of electricity.

Dam failures can also impact historic landmarks located downstream of the dam. In 2011, the Missouri River at Bismarck and Mandan rose to its highest levels since the Garrison Dam was completed in 1953. During this event, the dam exceeded the all-time-flow rate at 150,000 cfs, which forced the evacuation

of nearly 900 homes (NDDES, 2011). The flood waters impacted sacred/protected sites in the Standing Rock Sioux Reservation.

Property damage from dam incidents can occur downstream when failure occurs, but also can occur upstream from near failures as reservoirs extend beyond their traditional banks and flood nearby residences and buildings, as has occurred in Cavalier in 2022 and Lake Tschida in 2009 among other past dam incidents.

4.8.2.5 Critical Facilities, Community Lifelines, and State Assets

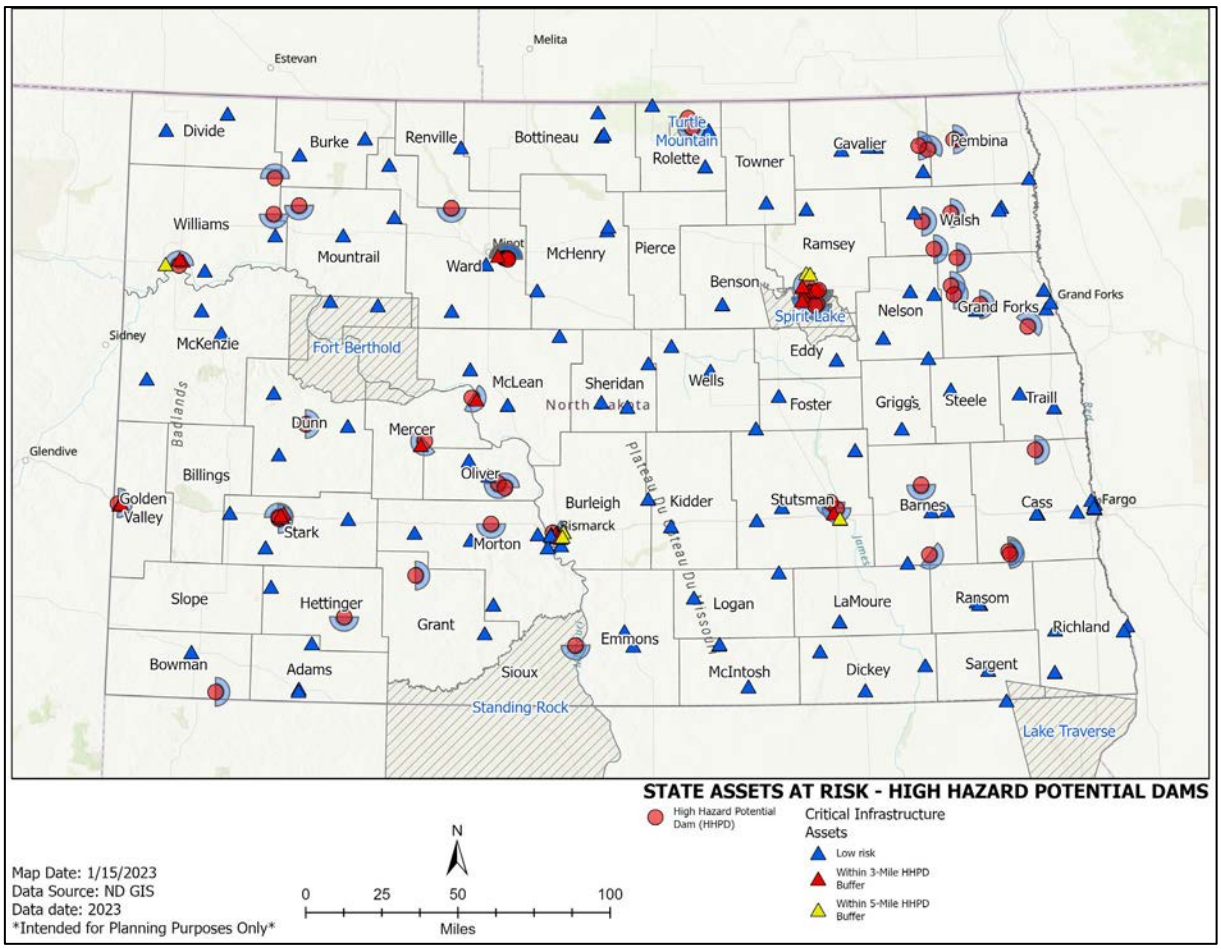
Belcourt Dam and Gordon Lake Dam, both north of Belcourt in the Turtle Mountains are the most vulnerable of dams. If they were to fail, water would flow through the middle of the community. Affected at Belcourt would be the IHIS Hospital, a major highway (US Highway 281/ND Highway 5), BIA Road #7, the business district, Belcourt Fire Hall, BIA Law Enforcement Building, and about 200 homes. Rural homes in the vicinity of Belcourt would also be affected. It is estimated about 450 people would be affected. As the water would flow down the gradient of the Turtle Mountains, it would flow out onto the Drift Prairie town of Rolette affecting about 100 homes and about 250 people in the city and the vicinity. Also affected would be the school, nursing home, and other critical infrastructure. Mylo, Rolla, and St. John have little or no risk from dam failure.

The opening of spillways can flood people who are otherwise without risk of flooding. The Garrison Spillway was opened for the first time in 2011, closing camp sites and other assets downstream in the spillway that filled with water that would need to be cleaned up before they could be re-opened to the public (Donovan, 2011). According to Donovan (2011), the area was already flooding, and the release expanded the flood's footprint, but it was necessary to alleviate the pressure on the dam from the heavy flood load.

Though considered highly unlikely, failure of the Garrison Dam today would place much of Bismarck, including the State Capitol and other state assets at risk from the surging wave of floodwaters from the release of Lake Sakakawea (Greenwald, 2021). According to Donovan (2011), along with the risk to Bismarck would be the loss of railroads, bridges, interstates, and other dams downstream.

The relationship between HHPD dam failure risk and state assets is shown in **Figure 4.8-23**. Buffers in the direction of inundation were created for a 3-mile and a 5-mile direction, and assets within those buffers were identified as at risk. Within three miles downstream of a possible HHPD dam failure in the state are 170 state assets, with 146 of them categorized as government assets, 17 agricultural, three communication assets and one banking asset (the Bank of North Dakota) as well as other uncategorized assets. The total insured amount within three miles of an HHPD dam failure is $302,210,194. An additional 28 state assets were within the additional 2-mile area, with 23 government and two chemical assets among them. Devils Lake and Bismarck had the highest concentration of assets at risk.

Figure 4.8-23: State Assets and Dam Failure Risk



Source: NID, 2023; NDGIS, 2023

4.8.2.6 State Economy and Economic Disruption

Most dams are small in nature and provide minimal economic disruption. Failure may impact a single farmstead in many instances. However, the loss of the Garrison Dam would have significant economic disruption that extends beyond the state of North Dakota. According to Greenwald (2021), in addition to the damage to infrastructure and flood footprint extending beyond the state line, the loss of the dam would impact electric generation and the navigability of the Missouri River.

Many of the areas impacted would be farmsteads, and dam failure during growing seasons would be devastating to not just the crops that suffer direct impact, but those that rely on irrigation waters from the impacted reservoir. The oil and gas industry also requires significant water inputs and would likely suffer a loss of access from a major dam loss.

4.8.2.7 Delivery of Service and Continuity of Operations

When a dam has failed or must be drained for rehabilitation or repairs, it can impact the ability for the dam reservoir to serve its traditional recreational, irrigation and water-resource functions for a lengthy period of time. According to Minot Daily News (2023), construction on the Garrison Dam closed the Missouri River in 1953, but the reservoir would not be full and generating at full power until 1960.

Figure 4.8-24. In 2023, Lake Ilo was drained for dam maintenance. It reduced water levels in Spring Creek and in the lake, impacting water availability to nearby ranchers, promoting weed growth, and killing fish as shown here (Friends of Lake Ilo, 2023; O'Day, 2023). It also stalled drilling permits while the reservoir filled again. These conditions are expected to persist until the reservoir returns to its operational level in 2025.

Figure 4.8-24: Dead Fish Clean-up near Lake Ilo Dam, 18 May 2023

Source: Friends of Lake Ilo, Facebook, 2023

4.8.2.8 Public Confidence in the State's Governance

For those who live in the upstream areas impacted by dams it can seem like they are the ones making the sacrifices, while those downstream receive the benefits until the dam fails. Upstream lands are lost for reservoirs (Reha 2003), changes in stream flow and other noxious hazards from environmental changes made for repairs or to alleviate risk of failure can be disproportionately felt by upstream residents (O'Day, 2023). When those decisions are locally made, they can find more tolerance than when they are perceived to be made from those who don't understand the balance of concerns between upstream and downstream residents, who can feel as if they are cut out of decision-making processes that occur far away.

In a public meeting relating to the draining of Lake Ilo, local farmer and rancher Ben Murphy said he felt as if state and local grievances were systematically ignored in the decision around the federal dam, and that local control would lead to better outcomes for upstream and downstream residents. "That's why when we had a manager that lived there, it was awesome. Because if the fish dumped his house stunk. If weeds were bad, the weeds in his yard were bad. Now it's different," Murphy said, adding that he believes too many of these decisions are being made by bureaucrats in Washington D.C. According to O'Day (2023), "They just don't have to live with the consequences, you know, to where they come down once a month for a day. I drive by that lake 358 days a year."

Gordon Lake Dam, when filled to capacity overflows into Belcourt Lake Dam. Thus, the two dams together can cause a hazard to a populated area in the event of dam failure. The area affected is the community of Belcourt. Affected at Belcourt would be the IHIS Hospital, a major highway (US Highway 281/ND Highway 5), BIA Road #7, the business district, Belcourt Fire Hall, BIA Law Enforcement Building, and about 200 homes. Rural homes in the vicinity of Belcourt would also be affected. It is estimated about 450 people would be affected.

(Turtle Mountain Nation Tribal Hazard Mitigation Plan, 2023)

4.8.2.9 Estimation of Annual Losses

In the 10 non-failure dam incidents that have occurred in the state since 2010, there have been 1,500 people evacuated and zero fatalities or injuries (ASDSO, 2023). According to ASDSO (2023), using the ASDSO dataset, North Dakota should anticipate an estimated 65 people evacuated annually from dam incidents.

If the dam failed, the evacuations would result in permanent displacement. To determine the cost of the displacement, the Benefit Cost-Analysis (BCA) Reference Guide pre-calculated values were used (FEMA, 2023), along with state averages related to housing size.

BCA Guidance indicates a one-time $500 per person plus $1.44 per-square-foot value for relocation (FEMA, 2023). The median house size in North Dakota is 2,190 square feet (American Home Size Index, 2022). The American Community Survey 2021 5-year estimates 2.37 people per household in the state of North Dakota (ACS, 2023). This estimates that if 27 homes were lost to a dam failure incident it would impact on average 65 people. Per the BCA Guidance (FEMA, 2023) this would make the cost to relocate each person $32,500 and the cost to relocate each property $85,148. The total estimated losses for relocation would be $117,648 per person.

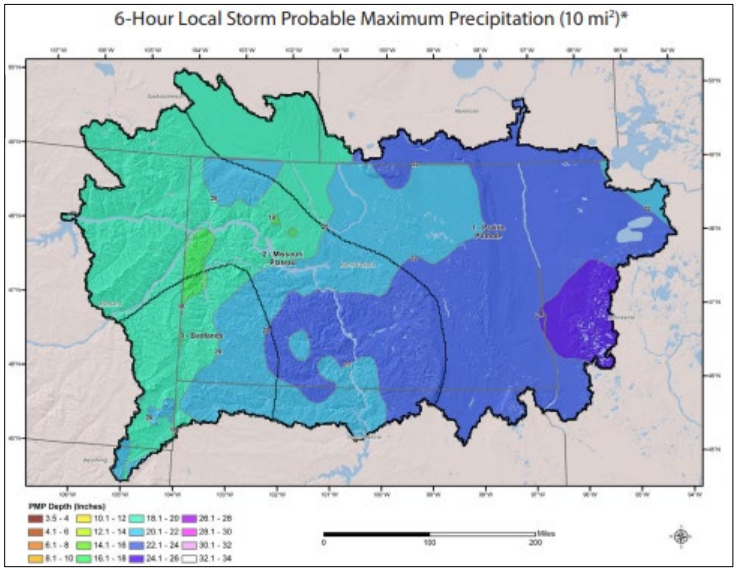
North Dakota has had dam failures and fatalities from these failures over time. The NPDP database lists 17 dam failures in the state since records began in 1900, identifying two fatalities in 2000.

Based on data from the U.S. Army Corps of Engineers, not including the loss of the dam itself, the value of its reservoir, the utilities it damaged or the property damage, but just the cost of relocating evacuated people and fatality values, the estimated annual loss for dam failure in North Dakota is $211,956.

4.8.2.10 Community Resilience

In 2021, a statewide Probable Maximum Precipitation (PMP) Study was conducted as shown in **Figure 4.8-25**. The study analyzed 52 storms and 100 years of snowpack to better understand the capabilities and challenges that 110 of the most at-risk dams in the state face (NDDWR, 2021). It improves greatly upon a previous 1978 study (NDDWR, 2021). DWR issued its final version of the Dam Safety Standards that became effective for all new dam construction permits and modifications January 1, 2024. The new standards update the 1985 Dam Design Handbook with state-of-the-practice requirements and processes. They incorporate and replace DWR's 2016 Emergency Action Plan Guidelines and 2022 Probable Maximum Precipitation Guidance. Further, the standards integrate the 2023 Hazard Classification Review process from DWR's Hazard Classification and Legacy Dam Policy. Alongside this effort, the Hazard Classification and Legacy Dam Policy has been updated to remove the previous hazard classification review process and now focuses solely on the legacy dam process.

Figure 4.8-25: Local 6-Hour Storm Data from the PMP Study, 2021



Source: Applied Weather Associates, 2021

The DWR has also been concentrating efforts on safety at low head dams, which can create a dangerous hydraulic roller effect and have been referenced as "drowning machines" and "killers in our rivers" by the Association of State Dam Safety Officials (ASDSO). The Dam Safety Program is working to update a prioritized inventory of the state's low head dams. Because recreational river users may not be aware of the hazards posed by low head dams, the DWR has been supportive of local entities and dam owners in both the removal of structures no longer serving a purpose and improving existing structures to increase safety through the agency's Cost-Share Program. The DWR has also been providing, free of charge, up to two cautionary safety signs to owners of low head dams. However, installation efforts of the signage are a local responsibility.

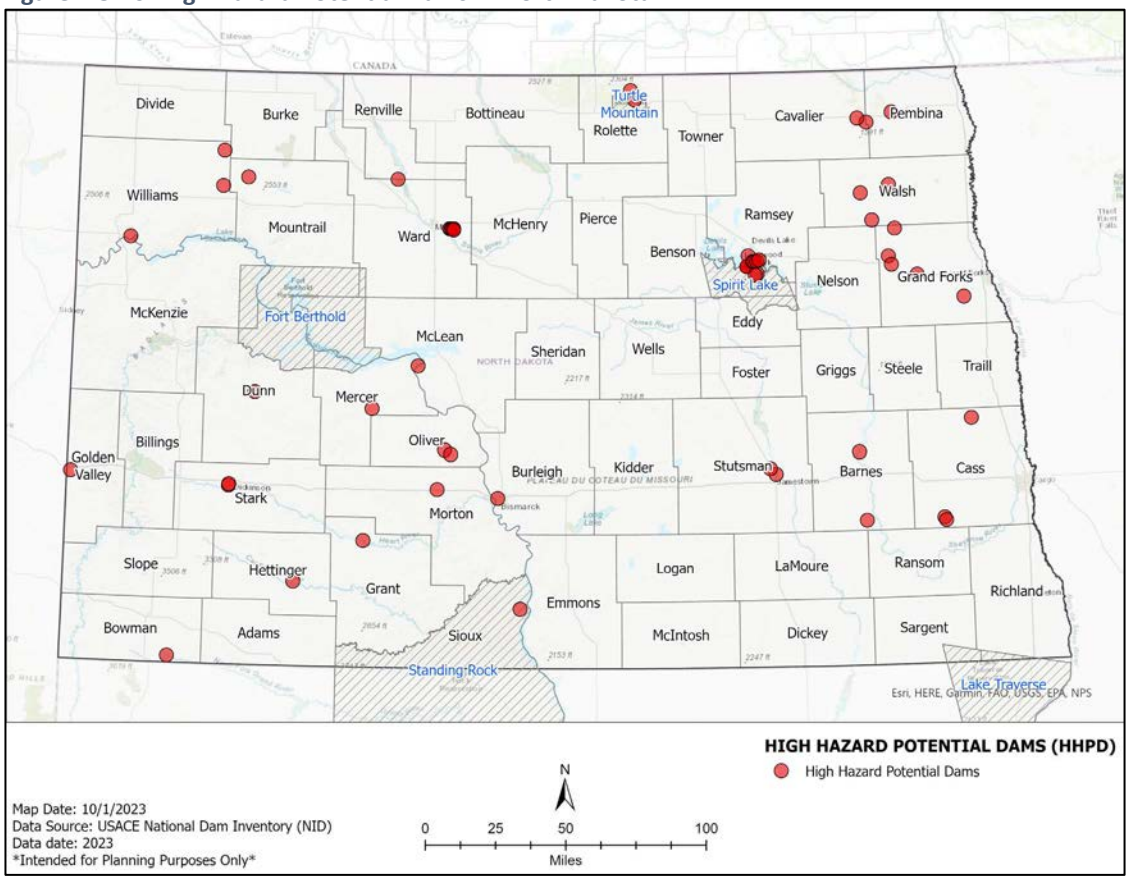
Staff also renewed emphasis on EAPs. North Dakota Century Code § 61-03-25 requires EAPs for all high hazard and medium hazard dams. The plans serve as a roadmap for identifying potential emergency conditions and require actions to minimize loss of life and property damage. The DWR encourages dam owners to work with local emergency management authorities to develop these plans. The Dam Safety Program has been working hard to achieve 100 percent compliance by dam owners.

The North Dakota DWR (2023) also has helped develop a set of legal guidelines (NDCC 61-03-25) and a template for developing EAPs for dams across the state, which can be important since most dams are not owned and maintained by the state or federal government.

Beginning in Fiscal Year 2020, FEMA initiated a targeted mitigation program toward High Hazard Potential Dams that provides three-year grants for non-federal dams for rehabilitation activities (National Dam Safety Program, 2020). According to the National Dam Safety Program (2020), for dams to be classified as a HHPD they must have an EAP and pose an unacceptable risk to the public to qualify for the grant.

The HHPDs that have been identified in the state of North Dakota are shown in **Figure 4.8-26**, below and in Appendix E.8.3.

Figure 4.8-26: High Hazard Potential Dams in North Dakota



Source: NID, 2023

While the state requires all medium-hazard and high-hazard dams to have EAPs according to the North Dakota Century Code, local capabilities can provide challenges to assuring the safety of those who live within inundation zones. The Department of Water Resources has conducted a Probable Maximum Precipitation study but assuring that local emergency managers know about the study, incorporate it into decision making, and effectively communicate risk to residents is a challenge. Outreach activities like the Plan Developers Webinar series can bring the experts to the local emergency manager audience and allow time for questions and a discussion of challenges. Local areas that are currently sparsely settled may undergo development in inundation zones that increase the hazard level of the dam and will eventually raise the hazard levels of dams. It may be the case, especially in areas like McLean, Morton and Williams counties that inundation zones and emergency action plans are unknown in the area because when the development occurs, the dam is considered low hazard. When the development

increases, the new hazard level elevates the legal requirements and creates a situation in which recent developments are in newly mapped inundation zones. Often new urban development in the state occurs just outside of urbanized areas where code enforcement resources may not exist.

4.8.2.11 Future Conditions

Through the end of this century in North Dakota, expect larger, more frequent, and more intense periods of both drought and heavy precipitation. Higher rainfall/snowfall may lead to more flooding, higher annual streamflow, and a higher incidence of rainfall enhanced snowmelt flooding which may adversely impact both reservoir and dam infrastructure, especially if antecedent flood/drought-induced damage is present. Information extracted from the NOAA National Centers for Environmental Information, Summary for North Dakota (Frankson, 2022), the Fifth National Climate Assessment (Knapp, 2023), and related resources, provides a basis for the following list:

During a November 9, 2023, Public Meeting, residents of Valley City discussed the danger posed by aging infrastructure at Baldhill Dam and the potential for Dam Failure. Participants highlighted the amount of water that could potentially inundate low lying portions of the community adjacent to the Sheyenne River. They expressed concern about Dam Failure and many other hazards. Community education and preparedness were two mitigation actions to address vulnerability.
Source: NDDES, 2023

- **Location:** Dam failures are possible at existing dam locations throughout the state, and those locations are not projected to change. Future climate conditions may necessitate the installation of temporary dams or levees, and dam failure would also be possible at any such locations.

  Extent/Intensity: Both periods of drought and periods of heavy rainfall and flooding are expected to increase, along with the speed and frequency of change between these conditions. These factors may increase the potential for dam failure and the potential downstream impacts from dam failure.

- **Frequency:** Both drought and heavy precipitation events are expected to occur more frequently, increasing the frequency of flood/flash flood events statewide, with a potential increase in dam failures. Additionally, the increasing age of existing dams could increase the rate of incidents.

- **Duration:** The duration of dam failures is not expected to change under future climate conditions.

4.8.2.11.1 Extreme Climate Variability and Climate Change

Through the end of this century North Dakota's natural yet extreme climate variability will likely continue to be the primary signal within each natural hazard (Frankson, 2022). This may directly or indirectly impact jurisdictions and peoples across the state over days to decades long timescales, while the much more subtle and gradual trends of climate change over the rest of this century are likely to further extend the range of such variability (Knapp, 2023). And as such studies show, both trend and variability could well extend beyond that which has previously been documented in the historical record.

Recent climate trends have shown, and future projections suggest that the state can expect continued gradual warming in all seasons, with greatest warming in the winter season. Overall precipitation is likely

to increase, with a high degree of inter-seasonal and interannual variability which could lead to longer and stronger droughts interspersed with more frequent and more intense flooding (Swain, 2015). As researchers have found, extreme weather events, warming temperatures, extreme cold weather, and increased precipitation can all contribute significantly to the location, extent, and frequency of dam failure and related impacts (Fluixá-Sanmartín, 2018). And severe summer and winter season storms will likely continue to occur in both drier, drought-prone periods, and wetter, flood-prone periods within the state's overall extreme climate variability.

More Extreme Drought and Flood Cycles

Recent decades have seen an increase in precipitation across North Dakota, with an overall lower frequency in drought conditions during a recent protracted wet cycle, with conditions from 1993 to 2019 considered to be part of the region's natural variability (Hoerling, 2010; Hoerling, 2013; Hoell, 2023). Just as Flash Floods can occur under conditions of more intense precipitation, Flash Drought can occur under conditions of drier conditions and higher temperatures (Otkin, 2018). Thus, both droughts and floods could increase in frequency and intensity.

In North Dakota, Drought/Flash Drought conditions can occur in rapid sequence with excessive wetness and Flood/Flash Flood episodes, from one month or season to another, even one year to another. During periods of drought, increased wildfire activity, burn scarred landscapes, and reduced evapotranspiration can further increase rainfall runoff rates and the risk of localized flooding or flash flooding (Williams, 2022). Rapidly changing landscape conditions, expected to increase under Future Climate scenarios, will likely lead to a more frequent incidence of destabilization of many geologic features (FHWA, 2023). Recent statewide examples of rapid change from flood to drought include the 2011 flood/2012 drought/2013 flood sequence; the 2017-18 drought/flash drought into 2019 flood sequence; and the 2021 flash drought with embedded flood and flash flood episodes.

4.8.2.11.1.1 Impact

Impacts of extreme flood and drought cycles which can impact dam safety include expansion and/or shrinkage of clay soils, with deep soil cracks forming on or near spillways and embankments, and with soil pulling away from other structural elements. Heavy rains which develop over drought-stricken lands often produce increased erosion, seepage, and slumping, as rushing runoff digs more deeply into deep soil cracks. As vegetation withers and soils crack, wind and water erosion can increase across more highly sloped terrain, in soil cracks along earthen spillways and alongside edges of concrete revetments or spillways, thus increasing the risk of future structural damages. Water can more easily penetrate the soil cracks near inlets, conduits, and other structures leading to seepage, piping, deformation, and other forms of weakening of dams and related structures (FEMA, 2018). Even low water, during periods of drought, may lead to undercutting of abutments and reservoir banks and subsequent soil collapse.

An extensive list of Future Climate impacted geohazards with specific references can be found in the Federal Highway Administration manual, FHWA-HIF-23-008 (FWHA, 2023), Table 2-2, p.12.

4.8.2.11.1.2 Adaptation

Adaptation actions might include the regular repair and maintenance of dams, spillways, and other structural components, regular cleaning of inlets and outlets, and proper tillage and landscape care. Additional actions may be like those discussed as mitigation actions, below.

4.8.2.11.1.3 Mitigation

With a potential for increased size, intensity, frequency, and/or duration of both heavy precipitation (w/flooding) and drought there should be an increased emphasis on longer-term mitigation strategies which reduce exposure extremes of drought and flood and strategies that minimize cascading effects, including rapid changes from drought to flood and flood to drought.

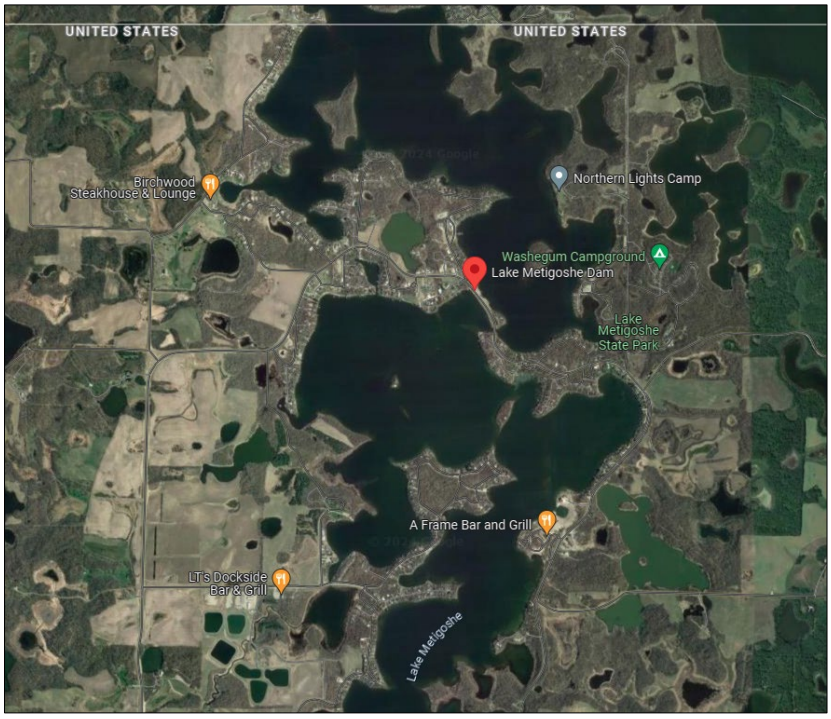
Efforts are underway to update overall reservoir and/or spillway capacity in response to updated PMP (Kappel et al., 2021) and resultant Probable Maximum Flood (PMF) (NDDWR, 2022). For example, upgrading earthen spillways may help reduce certain erosion possibilities that could increase as both drought and flood increase in size, intensity, frequency, and/or duration (Moore Engineering, 2023). However, jurisdictions are advised to contact local or state engineers to help determine appropriate mitigation options.

Additional mitigation actions can be found within the Drought, Flood, and Geologic Hazard profile sections.

4.8.2.11.2 Other Changes

Development downstream of dams can increase its hazards classification as it can put more lives and property at risk should the same dam fail. North Dakota has population growth in the Western part of the state and in its cities which can increase the potential loss of life and property. The National Association of Realtors also recognizes five North Dakota counties – Bottineau, Dunn, Grant, Kidder, and McLean -- as vacation home counties, where at least 20 percent of the housing stock is reported to the Census as for seasonal or recreational use (Yun, et. al, 2021). As illustrated by **Figure 4.8-27**, each of these counties has a reservoir in their primary recreational areas.

Figure 4.8-27: Vacation Homes, Camps, State Park, and Dam on Lake Metigoshe in Bottineau County



Source: Google Maps, Lake Metigoshe Dam, 2023

Urban areas of the state are anticipated to have a 24.6 percent growth rate between 2020 and 2040 (U.S. Census Bureau, 2020). Areas in and near Fargo, Grand Forks, Bismarck, and Williston will see more infill development and development on their fringe and nearby smaller communities, increasing the amount of property and people in the way of potential dam failure events.

Small farm growth in the James River Valley was specifically mentioned in the Stutsman County Multi-Hazard Mitigation Plan (2021), and the west side of Montpelier. Growth in McLean County (2022) especially near the Yanktonai Dam that lacks an EAP and mapped inundation areas, could raise the hazard level of the dam. In Mandan, 30 percent of recent development is within the likely inundation area, and as the city grows, the value of property and lives at risk will likely grow.

The western North Dakota counties of Dunn, McKenzie, Mountrail, and Williams have grown at a rate of 72.3 percent since 2010 (U.S. Census Bureau, 2020), and growth is expected to continue at a rate of 54.9 percent. This has already led to new development in areas like Williston, Minot and Dickinson and the rural areas between them. Williams County (2017) acknowledges that increasingly, growth is occurring in unincorporated areas where development is less regulated. Accommodating the booming oil and gas workforce and their young families will increase development and critical infrastructure in these areas, placing more people and property at risk from harm from dam failure. Development and increased population in these areas may lead to an upgrade in rating of dams in these areas from Significant to High potential hazard.

4.8.3 Risk Analysis

Risk can be defined as the potential for loss of or damage to an asset (FEMA EMI, 2023). This section analyzes the potential for loss or damage in the state of North Dakota.

4.8.3.1 National Risk Index

The National Risk Index does not evaluate this hazard.

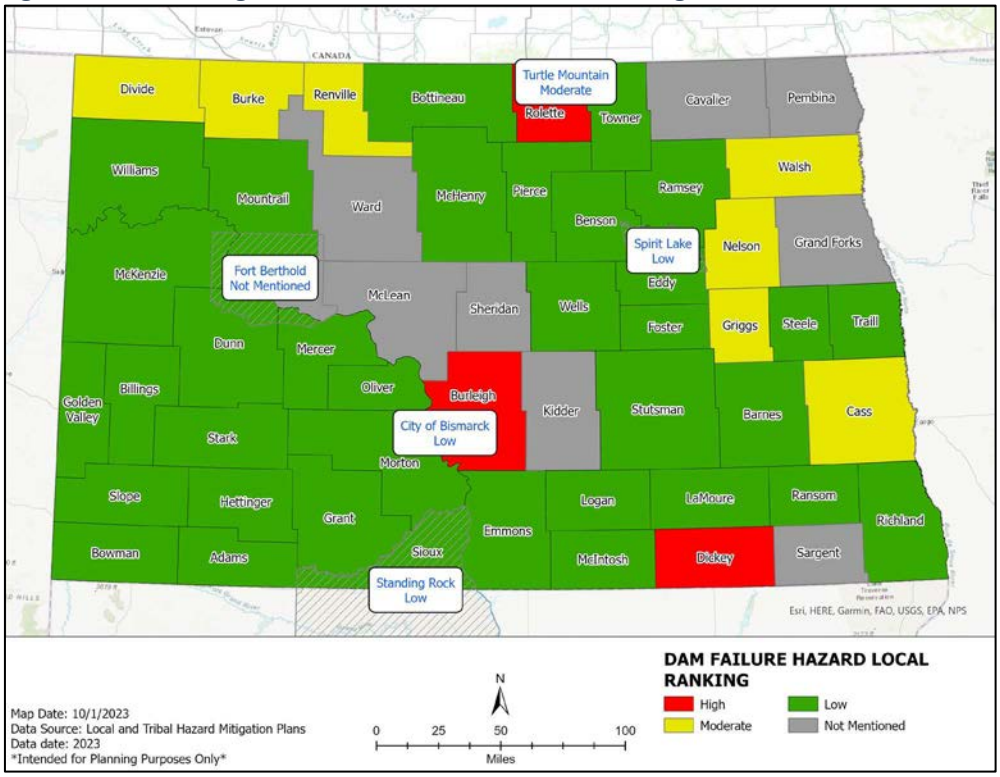
4.8.3.2 Risk Index Score

The Priority Risk Index for this plan update ranks dam failure releases as a moderate risk with a score of 2.3. Dam Failure is ranked 8th of 15 hazards.

4.8.3.3 Jurisdictions at Risk

Figure 4.8-28 shows how the state's local and tribal hazard mitigation plans evaluated dam failure. When evaluating local and tribal mitigation plans 49 of 58 of the jurisdictions identify dam failure as a hazard impacting their jurisdictions. However, of all plans that ranked hazards, 38 considered it a low risk, and three considered it high.

Figure 4.8-28: Ranking of Dam Failure in Local and Tribal Mitigation Plans



Source: Local and Tribal Hazard Mitigation Plans, 2023

As most local jurisdictions regard dam failure as a low priority it is sometimes not included or included with no action as low risk for local mitigation plans. Because dam failure is not viewed as high risk or a high priority and it is not included in local mitigation plans, resources are not devoted to creating mitigation strategies or grant activities devoted to addressing dam failure. While the new federal mitigation planning requirements for High Hazard Potential Dams (HHPD) is sparking interest with local and tribal planning teams, not all dams meet the necessary eligibility requirements.

Funding is always a challenge, particularly since many high hazard dams are not eligible for HHPD, based on an assessment by NDDWR. Local and tribal plans also currently lack the in-depth risk assessments required to meet HHPD mitigation planning requirements. More robust vulnerability analyses are required to fully understand the consequences to downstream communities if failure occurs. Planning teams also note that organizations with Emergency Action Plans often cite restrictions on release of information, which makes it challenging to obtain a complete picture of potential impacts of failure. In recognition of this mitigation strategies have been developed, as shown in Section 6, regarding the enforcement of compliance of new dam design standards and classification of existing dams. Additionally, strategies were developed to help identify eligible dams for grant programs to fund rehabilitation.

4.8.4 Summary/Conclusion

- Dam failures are most common during flooding events, but also occur when there is no precipitation.
- Many of North Dakota's dams are reaching more than 100 years in age.
- Most dams are small, and failure would have limited impact on society at large.
- Dams that can impact human lives have Emergency Action Plans in the state of North Dakota.
- The damage that would occur in the unlikely event of a Garrison Dam failure would impact national trade and severely burden the transportation system and river communities including Bismarck.
- The state has updated its knowledge about risk through a probable maximum precipitation study and is developing dam design standards for the state.
- Beginning in 2021, state agencies could enter information into the National Inventory of Dams directly. The state can set up protocols to include information about its wider inventory of dams in this public database. This would improve public information and potentially make more dams eligible for mitigation through the High Hazard Potential Dam program as they are classified for potential risk.
- Landslides and erosion along riverbanks are a threat to dam integrity. The North Dakota Geological Survey is developing a county-scale dataset about landslides, discussed in Section 4.12, and coordinating this information with information from the state DWR about dams may help to identify potential erosion hazards that can impact dam integrity.
- The Natural Resources Conservation Service along with the North Dakota DWR have seven ongoing or planned dam rehabilitation projects at the Senator Young Dam, Matejcek Dam, Olson Dam, Fordville Dam, Blyn Dam and Larimore Dam.
- The USACE has a major Pipestem Dam rehabilitation project, and the Bureau of Reclamation has a major rehabilitation program for the Heart Butte Dam. Both of these should reduce the likelihood of dam failure near the population centers of Jamestown and Mandan, respectively.
- The USACE's Garrison Dam rehabilitation project addresses an identified issue in the spillway that when fixed reduces the likelihood of failure that could impact Bismarck.

4.8.5 Data Limitations

Lack of data and lack of updated data are both difficult limitations to understanding the dam failure hazard. Many dams in the state have not had their hazard potential classified or their condition assessed, while others that have been assessed need to have the assessment updated. There is potential that the current inventory, federal or state, of dams is imperfect or missing dams given the variety of ownerships dams can have. Thus, the state would be working with an imperfect data set. Additionally, there are still many uncertainties to dam failure as it relates to climate change and future conditions that need further research and study.

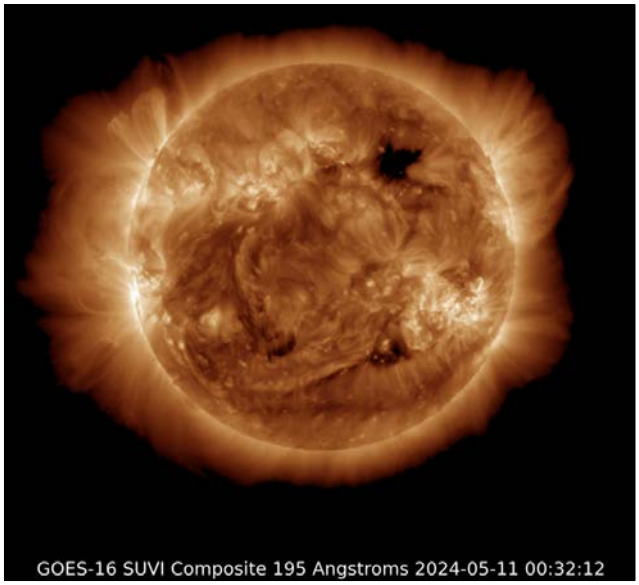
4.9 Space Weather

4.9.1 Overview

4.9.1.1 Description

Space weather is defined by the American Meteorological Society as, “dynamic conditions on the Sun and in the space environment, in particular, in the near-Earth environment” (American Meteorological Society, 2013).

Figure 4.9-1: The Sun, 7:32 pm CDT, 10 May 2024



Source: NOAA Space Weather Prediction Center, 2024

Figure 4.9-1 is the Sun on May 10, 2024, as shown by the NOAA Space Weather Prediction Center (SWPC), which monitors all space weather, harmful or not. The NOAA SWPC issues forecasts, watches, warnings, and alerts to keep us informed of the threat the Sun’s weather can deliver to Earth. According to the NOAA SWPC (2024), the image of the Sun includes dark spots, or coronal holes, where relatively cooler plasma exists, and where solar radiation storms and solar flares are more likely to emerge. It can be noted that there is a fuzzy haze around the round sun. This is due to solar winds that create geomagnetic storms.

Figure 4.9-2 shows several phenomena covered by space weather, some of which are defined below:

- **Galactic Cosmic Rays (GCR).** Galactic Cosmic Rays are high speed and highly energetic particles that constantly bombard the Earth from sources outside the solar system. These particles are from the nuclei of atoms ranging from helium through uranium, with all electrons having been stripped away, and are therefore fully ionized and very responsive to the Earth’s magnetic field. For people and systems on the ground, the Earth’s magnetic field largely deflects these particles away from the tropics and mid-latitudes. However, people and systems that are nearer the polar regions (more than 55 degrees magnetic latitude), especially those travelling by aircraft at high altitudes and high latitudes, are at an increased risk of radiation exposure from these events (NOAA SWPC, 2023). GCRs can also damage satellites and spacecraft electronics and systems.

- **Solar Winds.** The Solar Wind flows continuously from the Sun producing a background flow of charged particles, mainly protons and electrons, towards the Earth. Fluctuations in solar activity result in quiet periods with low-speed, uniform solar wind, and active periods with a mix of solar winds speeds and energy levels.

- **Solar Radiation Storms.** These are episodic and large-scale magnetic eruptions on the Sun’s surface that typically result in a Coronal Mass Ejection (CME) and/or associated Solar Flares. Solar Radiation Storms can send massive amounts of charged particles toward the Earth’s Magnetosphere over extended periods of time. Most lower energy particles are deflected away

from the Earth, but higher energy particles can penetrate the Magnetosphere where they are directed towards the upper atmosphere of the Polar regions. Solar Radiation Storms can expose aircraft passengers and crew of high altitude and high latitude flights to radiation risk, and impact high frequency (HF) radio communications nearer the ground (SWPC, 2023). Solar radiation storms are tracked by NOAA on the S-Scale and a warning is issued for S1 or higher solar radiation storms; alerts are issued as each S1 – S5 level is reached.

- **Solar Flares.** These are large eruptions of mixed electromagnetic radiation that erupt from the Sun, travel at speeds approaching the speed of light, and can last from minutes to hours. Their impact on the sunlit side of Earth's atmosphere occurs within minutes of the eruption and can degrade or completely blackout HF radio communications. NOAA issues forecasts using the R-scale, based on Blackout potential, and the C/M/X-Scale, based on X-Ray flux level. SWPC issues an alert whenever an M5 (R2) flare occurs, though no subsequent alerts are issued for higher levels (SWPC, 2023). A summary message is sent out when the flare is over and includes information about the maximum intensity reached and duration.

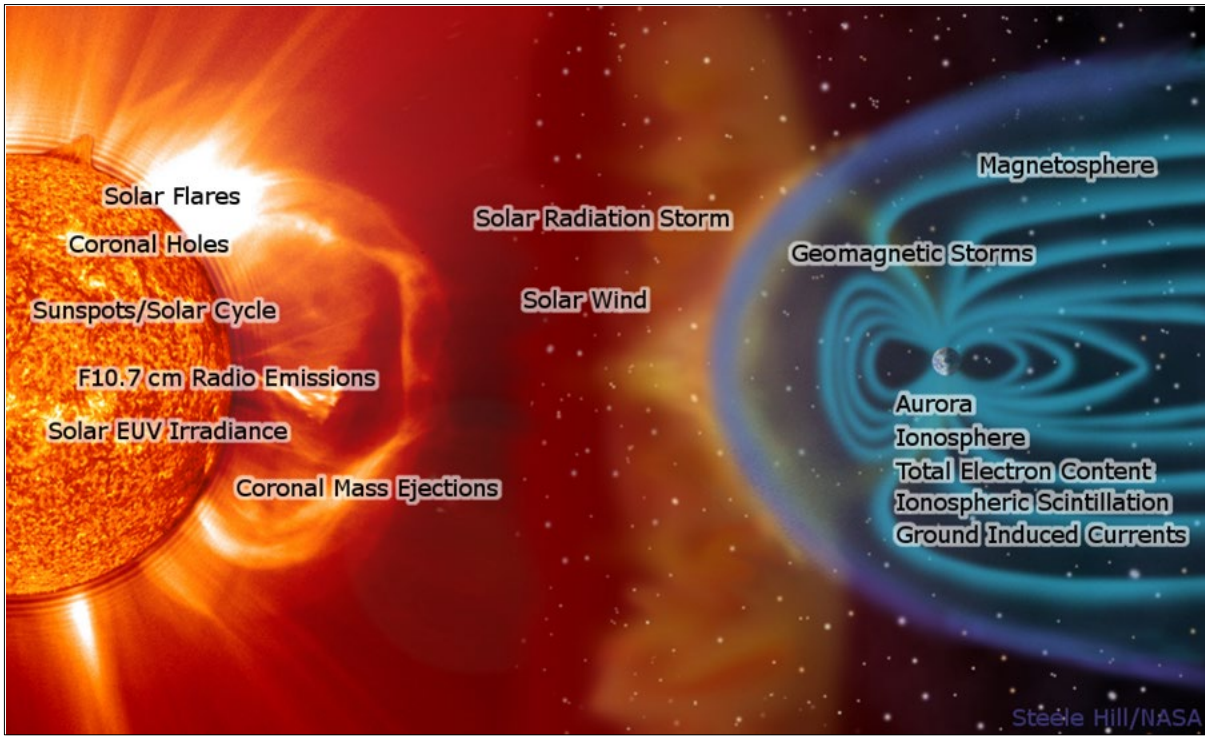
- **Coronal Mass Ejections.** CMEs are massive eruptions of plasma and its associated magnetic field from the Sun's surface layer, which because of their size and mass travel at a much slower rate of speed than Solar Flares. CMEs are directed energy that if directed towards Earth can reach Earth in as little as 15-18 hours at their fastest, or up to several days at their slowest. When CMEs transit space at speeds faster than the Solar Wind, they have a shock wave front, and if that shock wave arrives at the Earth, a near-instant geomagnetic response may occur, called a Sudden Impulse. The embedded magnetic field will normally arrive shortly afterward, which is usually when lengthier and stronger geomagnetic storms take place (SWPC, 2023). SWPC tracks the development and trajectory of CMEs via satellite. SWPC issues Geomagnetic Storm Watches and Warnings based on potential geomagnetic disturbance strength and impacts on Earth.

- **Geomagnetic Storms.** A geomagnetic storm is a disturbance in the Earth's atmosphere that derives from its interaction with solar winds. Solar winds are plasma containing electrons and protons that comprise the solar magnetic field. These winds sometimes impact Earth as geomagnetic storms as they reach Earth. Geomagnetic storms may result from the arrival of coronal hole high speed streams (CH HSS), but usually it is the more intense coronal mass ejections (CME) that drive conditions up to higher levels of geomagnetic storm levels. CMEs can reach Earth in as little as 15-18 hours at their fastest, but usually travel more slowly and take a few days to reach Earth. Geomagnetic storms can cause satellite drag, radio communication disruptions, GPS error, and damage to the power grid and pipelines. According to NOAA's SWPC (2023), NOAA tracks the threat from geomagnetic storms on its G-Scale. Geomagnetic Storm Watches are issued for G1, G2, G3, and G4 or greater. Warnings are issued on the Kp scale for Kp4, Kp5, Kp6, and Kp7 or greater. Alerts are issued at all Kp levels.

- **Auroras.** Known colloquially as the Northern or Southern Lights, this colorful light show in the higher latitude night sky is primarily caused by electrons of Solar origin, streaming into and along the Earth's magnetic field where they descend into the upper atmosphere, typically in an oval pattern surrounding the North and South Poles. As these electrons impact the upper atmosphere they ionize, or excite, upper atmospheric gases (primarily oxygen and nitrogen) and produce light, typically in a circumpolar band called the Aurora Oval. Periodic increases in Solar activity result in increased space weather activity, with more frequent displays of aurora and an

increased equatorward extent of these lights. Auroras are not particularly dangerous to people, but they do affect radio communications in the short term, and their electrically charged particles can have long-term negative effects to infrastructure and technology (SWPC, 2023; Hurtigruten, 2023). NOAA's SWPC doesn't issue alerts or warnings directly tied to the auroral oval or extent, though its *experimental* online Aurora Dashboard forecasts are very popular.

Figure 4.9-2 NOAA Space Weather Prediction Center Weather Diagram



Source: NOAA Space Weather Prediction Center, 2023

NOAA's SWPC is the official source of space weather warnings and alerts for the United States. Located in Boulder, Colorado, the SWPC is staffed 24 hours a day, every day, to monitor space weather and issue public warnings or alerts, and to otherwise provide critical infrastructure notifications related to the intensity of observed activity over an upcoming 3-hour period (Dahl, 2023). Among those who may receive direct notification from the SWPC are the National Aeronautics and Space Administration (NASA), the North American Electric Reliability Corporation (NERC), and FEMA.

4.9.1.2 Previous Occurrences

The following section describes notable and recent events of space weather in the state of North Dakota and around the world.

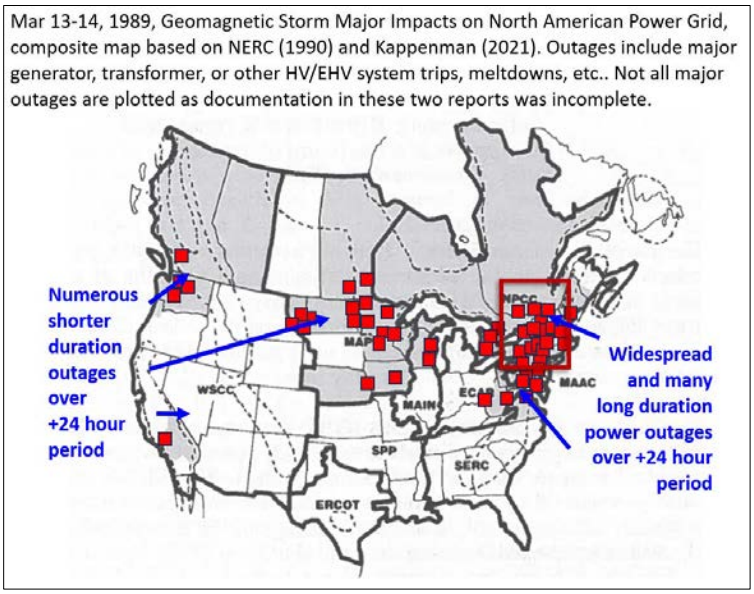
- The Carrington Event in September 1859 disrupted communications, caused sparks, and ignited fires in telegraph offices in a largely pre-electric world. Vivid auroras were seen across the globe, in both northern and southern hemispheres. According to Dobrijevic and May (2022), the next

event of Carrington scale or perhaps smaller may cost more than $2.6 trillion in damages in the U.S. alone, according to Lloyd's of London.

- An event in 1921 known as the New York Railroad Storm is considered the biggest in the 20th century and may have rivaled the Carrington Event. Its name comes from the disruption to trains caused by a fire in the railroad control tower in Brewster due to build up on the third rail from the geomagnetic storm. That control tower burned to the ground and telegraph services across the U.S., including ND, were delayed due to blown fuses and damaged equipment (O'Callaghan, 2019). Ontario and Sweden also experienced similar impacts.

- The Great Quebec Blackout of 1989 was the result of a solar storm/space weather event that brought significant power fluctuations and outages to the bulk power distribution systems in North America, including areas like North Dakota which are served by the Western Area Power Administration (**Figure 4.9-3**), along with portions of Northern Europe and Scandinavia (NERC, 1990; OECD, 2011). Damages were most extreme across Quebec and portions of New England, with Hydro-Quebec experiencing outages lasting nine hours or longer, leaving an estimated 6 million people without electricity, with cascading impacts across the United States/Canada shared electrical grid. New York Power and New England Power had a significant loss of power with service disrupted to 96 utilities in New England before backup power sources came online. Satellites tumbled in space and the space shuttle Discovery had unusual error messages (Odenwald, 2009). That CME, 36 times the size of Earth, produced power surges that destroyed a transformer at a nuclear reactor in New Jersey.

Figure 4.9-3: Impacts on the North American Power Grid, 13-14 March 1989



Source: NERC, 1990; and Kappenman, 2021

- A space weather event impacted Operation Anaconda in Bagram, Afghanistan, on March 4, 2002, resulting in the death of three Americans and the crash of a Chinook helicopter (AGU News, 2014). The crash and fatalities occurred because a message which instructed the team to avoid an enemy-held peak was not received, due to a space weather induced radio outage.

- Sweden took most of the impact from an October 2003 event known as the Haunting Halloween Storms. These were a series of 17 solar flares and CMEs beginning in mid-October, peaking around October 28, and ending in early November. The event left 50,000 without power in

Malmo. The country experienced train delays and had to shut down air space. Sweden was not alone in its struggle. South Africa lost 15 transformers plunging parts of the country into darkness, Japan lost a scientific satellite, TV, and radio disruptions ringed the planet, and flights over the North Pole lost communications (Malik, 2022). Even communications with Antarctic scientists were cut off for 130 hours.

- In July 2012, a potentially Carrington-scale event was a near-miss to Earth. It tore through Earth's orbital route on July 23, but Earth was one-week further down its path, leaving a STEREO-A spacecraft to take the hit (Baker, 2013). Using a geomagnetic forecast model, Baker (2013) estimates that the 2012 event could have easily equaled the strongest event of the 20th century, the Quebec 1989 event (Dst ~-500 nT), with the most extreme modelled values approaching Dst ~-1189nT, potentially meeting or exceeding the Carrington 1859 Event.

- According to the Associated Press (2015), Sweden's air traffic control was knocked offline, leading the nation to close airspace for more than an hour when flights disappeared from screens due to space weather in November 2015.

- SpaceX owner Elon Musk sent 49 satellites into space on February 3, 2022, only to have them encounter space weather the next day, losing up to 40 of the 49 satellites that were sent to join his Starlink satellite internet network (BBC News, 2022). The satellites fell from orbit and were burned up in the Earth's atmosphere. According to Patel (2022), the Starlink satellites are smaller than most satellites and orbit at a lower altitude, making them more vulnerable to even mild events like this 2022 event.

- Recent research has uncovered an extreme type of solar event that may occur in an approximate 1,000 yr. interval. These events, known as "Miyake Events", named from the Japanese scientist who discovered them in 2012, have the potential to be severely destructive to global infrastructure and communications. Although these types of events are currently not well understood or predicted, their possibility of occurrence should continue to be evaluated and considered as an extreme end case in space weather and long-term mitigation planning.

- In March 2023, a solar storm anticipated to be a G2 event arrived as a G4, causing auroras as far south as Alabama and impacting radio communications (Baker, 2023). The mis-forecast occurred because the responsible CME had a favorable (southward directed) component and was also more Earth-directed than anticipated. It

Figure 4.9-4: STEVE in the South Dakota Badlands, 24 March 2023

Source: Evan Ludes, Framed by Nature, 2023. Reprinted with permission.

created a visual phenomenon called STEVE, or a strong thermal emission velocity enhancement that looks like a long streak of colorful light, as seen in **Figure 4.9-4** (Dobrijevic, 2023). This event even delayed one of Rocket Lab's scheduled launches. Later in August, a solar flare caused radio blackouts in North America. While a smaller G2 event occurred in mid-September 2023.

4.9.1.3 Location and Extent

Space weather that is monitored by the SWPC is categorized in scales shown in **Figures 4.9-5**, **4.9-6**, and **4.9-7**. These figures also give some indication as to the consequences, which will be discussed later in this section. For most North Dakotans, geomagnetic storms are what pose the greatest risk since most would be unimpacted by a loss of high-frequency (HF) radio transmissions or an increase in radiation in the upper levels of the atmosphere and polar regions of the globe. A disruption to the power grid would be felt by more residents. Grid operators use the Kp-scale to discuss space weather, and the relative G-scale comparison is shown in **Figure 4.9-5.**

Figure 4.9-5: Geomagnetic Storms Scale

Scale	Description	Effect	Physical measure	Average Frequency (1 cycle = 11 years)
G 5	Extreme	**Power systems:** Widespread voltage control problems and protective system problems can occur, some grid systems may experience complete collapse or blackouts. Transformers may experience damage. **Spacecraft operations:** May experience extensive surface charging, problems with orientation, uplink/downlink and tracking satellites. **Other systems:** Pipeline currents can reach hundreds of amps, HF (high frequency) radio propagation may be impossible in many areas for one to two days, satellite navigation may be degraded for days, low-frequency radio navigation can be out for hours, and aurora has been seen as low as Florida and southern Texas (typically 40° geomagnetic lat.).	Kp = 9	4 per cycle (4 days per cycle)
G 4	Severe	**Power systems:** Possible widespread voltage control problems and some protective systems will mistakenly trip out key assets from the grid. **Spacecraft operations:** May experience surface charging and tracking problems, corrections may be needed for orientation problems. **Other systems:** Induced pipeline currents affect preventive measures, HF radio propagation sporadic, satellite navigation degraded for hours, low-frequency radio navigation disrupted, and aurora has been seen as low as Alabama and northern California (typically 45° geomagnetic lat.).	Kp = 8, including a 9-	100 per cycle (60 days per cycle)
G 3	Strong	**Power systems:** Voltage corrections may be required, false alarms triggered on some protection devices. **Spacecraft operations:** Surface charging may occur on satellite components, drag may increase on low-Earth-orbit satellites, and corrections may be needed for orientation problems. **Other systems:** Intermittent satellite navigation and low-frequency radio navigation problems may occur, HF radio may be intermittent, and aurora has been seen as low as Illinois and Oregon (typically 50° geomagnetic lat.).	Kp = 7	200 per cycle (130 days per cycle)
G 2	Moderate	**Power systems:** High-latitude power systems may experience voltage alarms, long-duration storms may cause transformer damage. **Spacecraft operations:** Corrective actions to orientation may be required by ground control; possible changes in drag affect orbit predictions. **Other systems:** HF radio propagation can fade at higher latitudes, and aurora has been seen as low as New York and Idaho (typically 55° geomagnetic lat.).	Kp = 6	600 per cycle (360 days per cycle)
G 1	Minor	**Power systems:** Weak power grid fluctuations can occur. **Spacecraft operations:** Minor impact on satellite operations possible. **Other systems:** Migratory animals are affected at this and higher levels; aurora is commonly visible at high latitudes (northern Michigan and Maine).	Kp = 5	1700 per cycle (900 days per cycle)

Source: NOAA Space Weather Prediction Center, 2023

Space weather events have impacts that can and often do affect North Dakotans. North Dakota is centered in the Aurora Oval band that regularly spans the U.S./Canadian border and which most often experiences space weather events (Maffei, 2023). Space weather interacts with satellites, with surface power transmission and communications lines, and can even induce geomagnetic currents which impact power lines and pipelines below ground (EPA, 2023; SWPC, 2023). In North Dakota, our interpersonal communications capabilities, our business and home operations, our agricultural productivity, and our energy production and transmission – that critical infrastructure – is increasingly reliant on technologies that are most at risk to space weather events.

Figure 4.9-6: Radio Blackouts Scale

Scale	Description	Effect	Physical measure	Average Frequency (1 cycle = 11 years)
R 5	Extreme	**HF Radio:** Complete HF (high frequency) radio blackout on the entire sunlit side of the Earth lasting for a number of hours. This results in no HF radio contact with mariners and en route aviators in this sector. **Navigation:** Low-frequency navigation signals used by maritime and general aviation systems experience outages on the sunlit side of the Earth for many hours, causing loss in positioning. Increased satellite navigation errors in positioning for several hours on the sunlit side of Earth, which may spread into the night side.	X20 (2×10^{-3})	Less than 1 per cycle
R 4	Severe	**HF Radio:** HF radio communication blackout on most of the sunlit side of Earth for one to two hours. HF radio contact lost during this time. **Navigation:** Outages of low-frequency navigation signals cause increased error in positioning for one to two hours. Minor disruptions of satellite navigation possible on the sunlit side of Earth.	X10 (10^{-3})	8 per cycle (8 days per cycle)
R 3	Strong	**HF Radio:** Wide area blackout of HF radio communication, loss of radio contact for about an hour on sunlit side of Earth. **Navigation:** Low-frequency navigation signals degraded for about an hour.	X1 (10^{-4})	175 per cycle (140 days per cycle)
R 2	Moderate	**HF Radio:** Limited blackout of HF radio communication on sunlit side, loss of radio contact for tens of minutes. **Navigation:** Degradation of low-frequency navigation signals for tens of minutes.	M5 (5×10^{-5})	350 per cycle (300 days per cycle)
R 1	Minor	**HF Radio:** Weak or minor degradation of HF radio communication on sunlit side, occasional loss of radio contact. **Navigation:** Low-frequency navigation signals degraded for brief intervals.	M1 (10^{-5})	2000 per cycle (950 days per cycle)

Source: NOAA Space Weather Prediction Center, 2023

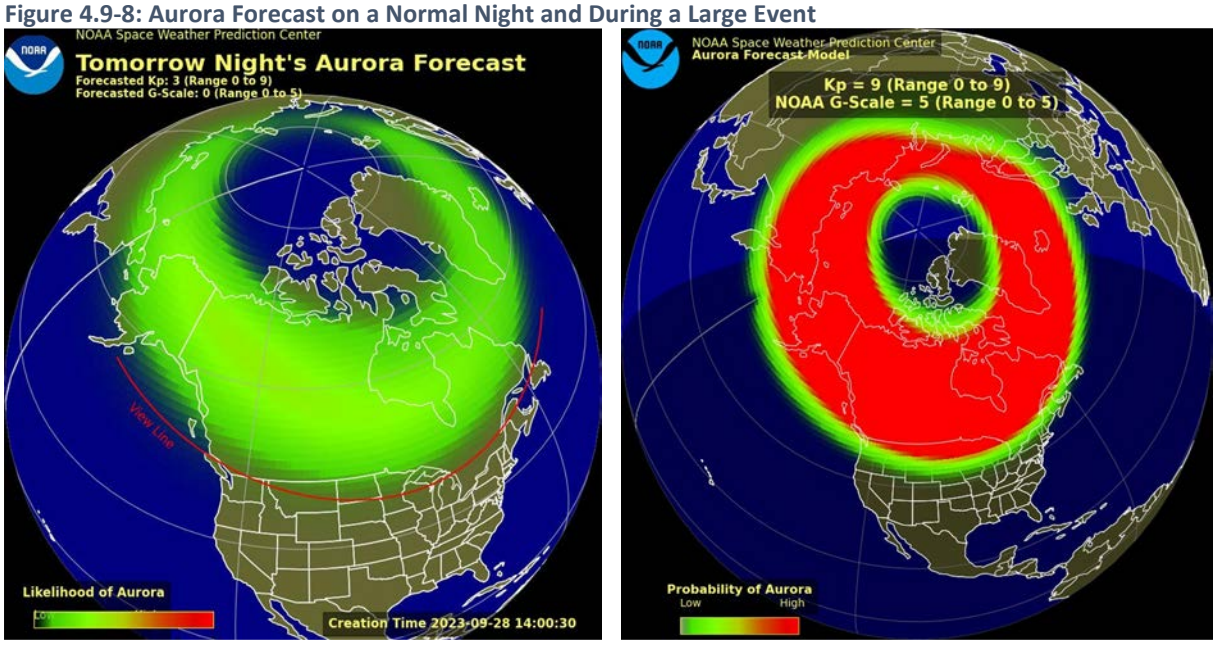
Figure 4.9-7: Solar Radiation Storms Scale

Scale	Description	Effect	Physical measure (Flux level of >= 10 MeV particles)	Average Frequency (1 cycle = 11 years)
S 5	Extreme	**Biological:** Unavoidable high radiation hazard to astronauts on EVA (extra-vehicular activity); passengers and crew in high-flying aircraft at high latitudes may be exposed to radiation risk. **Satellite operations:** Satellites may be rendered useless, memory impacts can cause loss of control, may cause serious noise in image data, star-trackers may be unable to locate sources; permanent damage to solar panels possible. **Other systems:** Complete blackout of HF (high frequency) communications possible through the polar regions, and position errors make navigation operations extremely difficult.	10^5	Fewer than 1 per cycle
S 4	Severe	**Biological:** Unavoidable radiation hazard to astronauts on EVA; passengers and crew in high-flying aircraft at high latitudes may be exposed to radiation risk. **Satellite operations:** May experience memory device problems and noise on imaging systems; star-tracker problems may cause orientation problems, and solar panel efficiency can be degraded. **Other systems:** Blackout of HF radio communications through the polar regions and increased navigation errors over several days are likely.	10^4	3 per cycle
S 3	Strong	**Biological:** Radiation hazard avoidance recommended for astronauts on EVA; passengers and crew in high-flying aircraft at high latitudes may be exposed to radiation risk. **Satellite operations:** Single-event upsets, noise in imaging systems, and slight reduction of efficiency in solar panel are likely. **Other systems:** Degraded HF radio propagation through the polar regions and navigation position errors likely.	10^3	10 per cycle
S 2	Moderate	**Biological:** Passengers and crew in high-flying aircraft at high latitudes may be exposed to elevated radiation risk. **Satellite operations:** Infrequent single-event upsets possible. **Other systems:** Small effects on HF propagation through the polar regions and navigation at polar cap locations possibly affected.	10^2	25 per cycle
S 1	Minor	**Biological:** None. **Satellite operations:** None. **Other systems:** Minor impacts on HF radio in the polar regions.	10	50 per cycle

Source: NOAA Space Weather Prediction Center, 2011

Figure 4.9-8 shows a forecast for visual auroras from space weather during a Kp3 (Unsettled) period in September 2023, left image, and during a simulated Kp9/G5 (Extreme) period, right image. During a heightened Kp3 (Unsettled) level or Kp4 (Active levels), far northern parts of North Dakota might see the aurora along the horizon. G1 levels (Kp5) and higher are more likely to bring the aurora overhead in North Dakota skies. G5 levels (Kp9) could bring aurora overhead deep into the Central Plains. According to the SWPC (2023), seeing the colorful light show does not necessarily coincide with negative impacts.

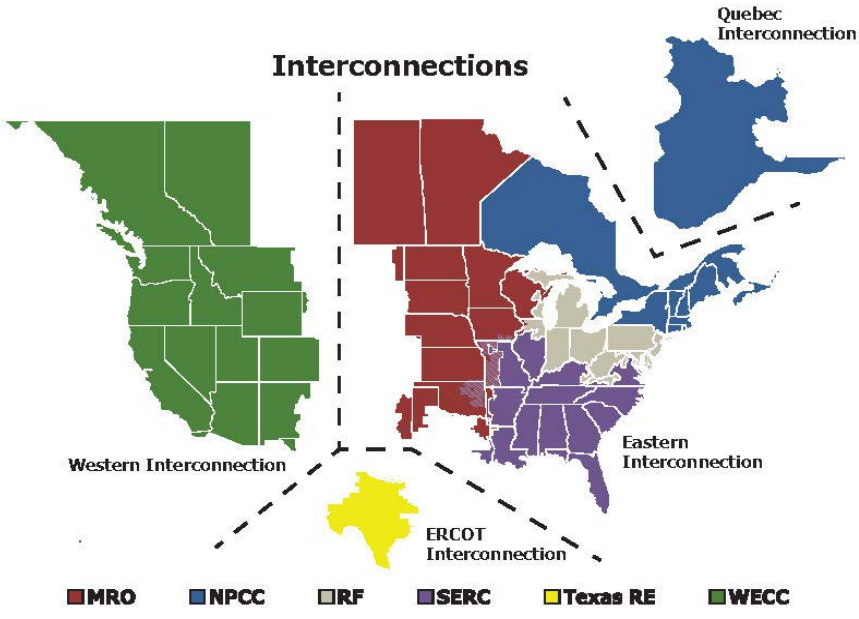
Figure 4.9-8: Aurora Forecast on a Normal Night and During a Large Event



Source: Space Weather Prediction Center, 2023

As shown in **Figure 4.9-9**, negative impacts from space weather phenomena that result in power outages and electrical grid damage within North Dakota, can occur from unbalanced voltages occurring anywhere throughout the eastern interconnection of the electrical grid in North America. For example, Geomagnetic activity that results in geomagnetic induced currents (GIC) along high transmission lines or excessive heating of transformers in distant states, such as in Rhode Island or Alabama, are more capable of impacting North Dakota than similar damage experienced in Montana or Wyoming.

Figure 4.9-9: NERC Interconnection Map



Source: North American Electric Reliability Cooperation, 2023

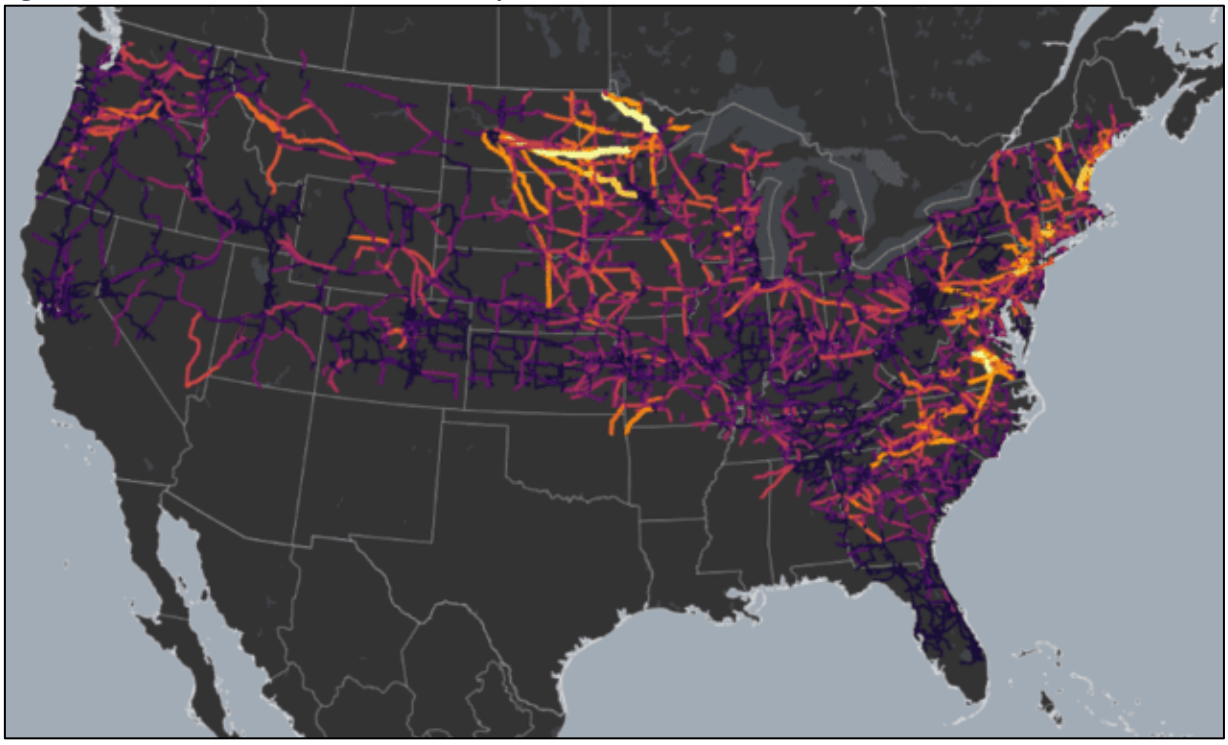
The North American Electric Reliability Corporation (NERC) is the organization of grid operators who work together to assure reliable and secure bulk electric production and distribution throughout Canada and the United States. During normal operations, the interconnections operate as if controlled by a single nervous system of electricity transmission, separate from the other interconnection areas.

However, a problem experienced in one area can create problems across the entire interconnection area. This has been experienced through non-space weather emergencies, such as the Great Northeast Blackout of 2003, where a transmission line fault in Ohio caused a mass power outage stretched from Ontario to Detroit, through New England and New York. The event contributed to at least 11 deaths and cost an estimated $6 billion across North America, costing the city of New York $500 million alone, and 50 million people went without power (History.com, 2020). In contrast, the Texas power crisis of February 2021 was limited solely to Texas due to the state's grid being isolated from the rest of the nation, and unable to draw from other areas of the continent during a brutal cold snap (Jones, 2021).

The U.S. Geological Survey (USGS) began analyzing the grid to better determine the voltage likely to be experienced on power lines in the nation should a Carrington-level event occur again. Part of the surge created occurs due to the interaction between the above-ground transmission lines and the below-ground magnetic field of the Earth's crust and mantle.

The geologic magnetic field is not fully mapped out in the United States, but what is mapped includes North Dakota. The results of the study are shown in **Figure 4.9-10**. Areas in dark violet would see a 10-volt surge, which is unlikely to cause a problem. The lighter the color, the greater the surge, with light yellow representing well over 100 volts, which would be much more likely to cause outages and transformer damage in the area. According to Physics World (2020), much of southeastern North Dakota is light yellow, placing this part of the state at greater relative risk than many other areas of the country.

Figure 4.9-10: USGS Geoelectrical Hazard Map



Source: USGS, 2020

While the electrical lines may not be ideally aligned with the Earth's magnetic field, the state is a net exporter of energy and does not, at this time, utilize its transformer capacity to the point of becoming overloaded. This helps protect the state's grid from serious damage and prolonged outages as it waits for lengthy repairs.

Electrical power for rural LaMoure County runs through six substations. The cities of LaMoure County each have their own substations. It is estimated that it would require from three to six weeks to replace a destroyed substation if the necessary resources were available. A major space weather event would place fixing these substations far down the list of priorities, and the replacement time would be much greater. *(LaMoure County Multi-Jurisdictional Hazard Mitigation Plan, 2020)*

Figure 4.9-11 shows the extra-high-voltage transformer capacity by state. According to the National Research Council (2008), North Dakota ranks amongst the lowest states at using its capacity at seven percent, limiting the likelihood of transformer overloads from a significant geomagnetic event.

Figure 4.9-11: EHV Transformer Capacity

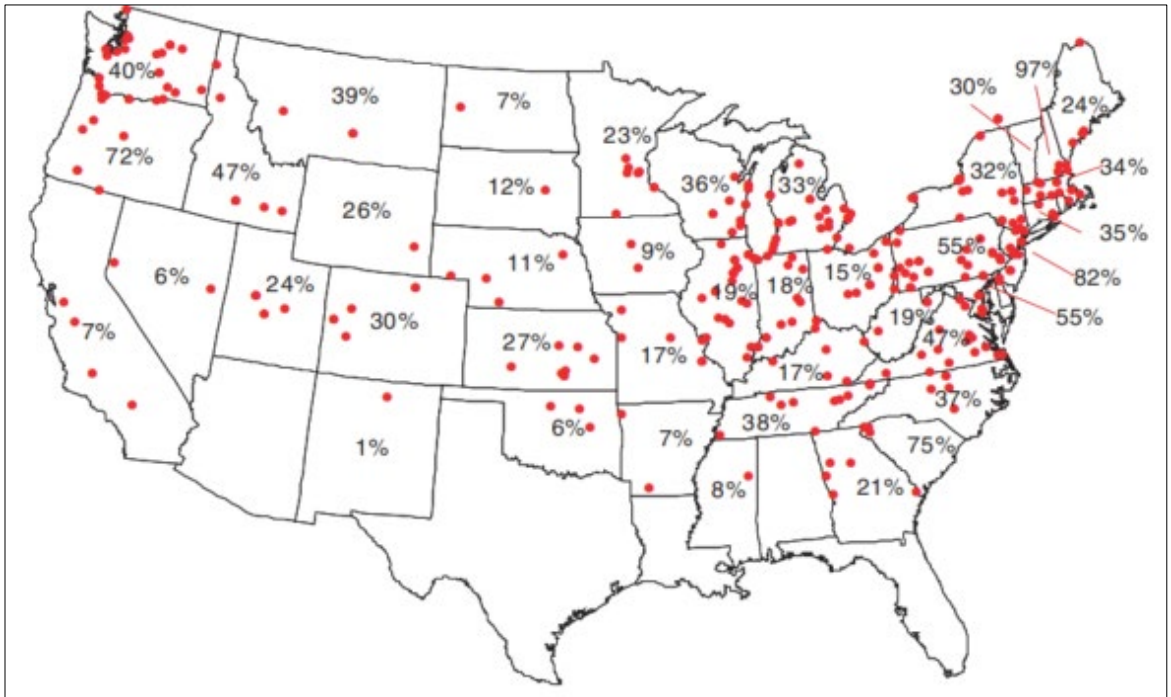
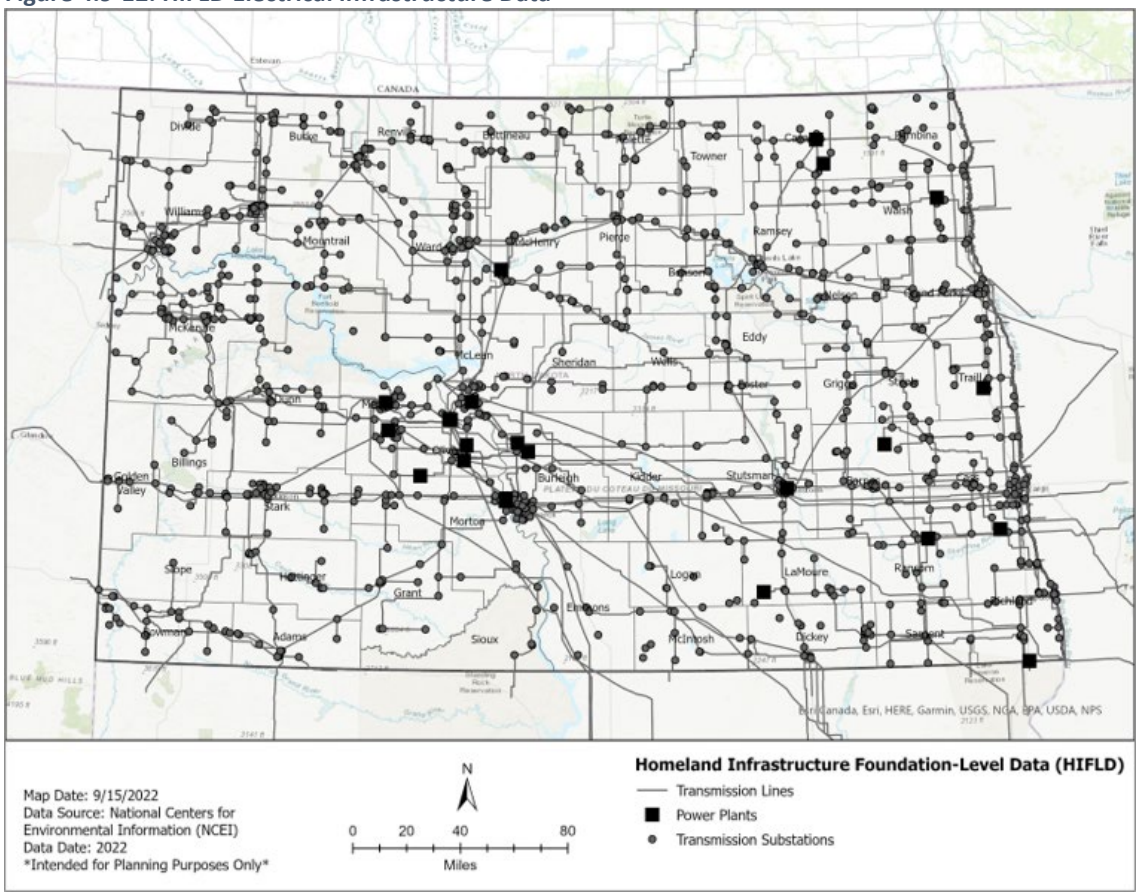


FIGURE 7.2 A map showing the at-risk EHV transformer capacity (estimated at ~365 large transformers) by state for a 4800 nT/min geomagnetic field disturbance at 50° geomagnetic latitude. Regions with high percentages of at-risk capacity could experience long-duration outages that could extend multiple years. SOURCE: J. Kappenman, Metatech Corp., "The Future: Solutions or Vulnerabilities?," presentation to the space weather workshop, May 23, 2008.

Source: National Research Council, 2008

Figure 4.9-12 shows the locations of major transmission lines, power plants, and transmission substations as represented in the Homeland Infrastructure Foundation-Level Data. According to NCEI (2022), it illustrates where there is infrastructure that could experience damage in a severe space weather event. Vulnerabilities exist along the Missouri River starting in McLean County and stopping around the Emmons County line, and in urban areas around the state.

Figure 4.9-12: HIFLD Electrical Infrastructure Data



Source: NCEL, 2023

Figure 4.9-13 shows an overview of the spatial extent in relation to resources from a space weather event occurring in the state.

Figure 4.9-13: Spatial Extent for Space Weather

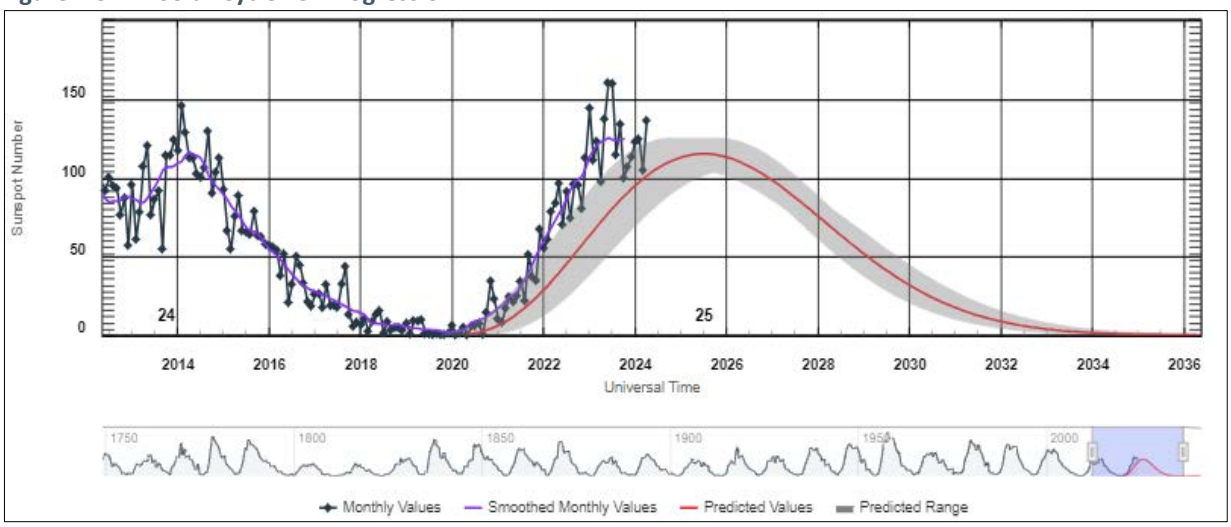
Resource	Extent
Public	Regional
First Responders	Statewide
Delivery of Service and Continuity of Operations	Regional
Property, Facilities, and Infrastructure	Statewide
Environment	Limited
State Economy	Regional
Public Confidence in the State's Governance	Statewide

4.9.1.4 Probability

Most space weather reaches the Earth with little impact, with mitigated impacts, or with impacts that are felt by people or industries that rely on high frequency (HF) radio communications, are engaged in high-latitude aviation, or use satellite high-precision GPS. A large G4 or G5 event would have more widespread global impacts, including power outages, loss of communications, closure of air space, and transformer damage and fires, and North Dakota is squarely in the danger zone (area of highest vulnerability) from such events (Maffei, 2023). The duration of the event matters as well. An event that continues for 18 to 24 hours has the possibility of enacting more damage than a short-lived event (Dahl, 2023). According to Hapgood (2019), a recent, similar solar event can also clear the pathway for disturbances and increase the impacts and speed of a geomagnetic event. This was likely a factor in some recent events, such as the 1921 and 1989 blackouts.

The Sun goes through approximately 11-year periods of minimum activity and maximum activity called solar cycles. It's currently in Solar Cycle 25, which began at the end of 2019 and is expected to peak in late 2024 or early 2025. **Figure 4.9-14** shows data related to Solar Cycle 25 progression and to previous solar cycles. The gray area and red line on both graphs show the forecasted number of sunspots for Solar Cycle 25, where sunspots mark the origin of most space weather. The black and blue lines in both graphs show the actual values for the periods on the horizontal axis (SWPC, 2023). According to Dahl (2023), actual values have been higher than forecast at this point in the cycle, which may mean a stronger maximum or just an earlier peak.

Figure 4.9-14: Solar Cycle 25: Progression



Source: SWPC, 2023

Every sunspot creates an impactful geomagnetic event potentially aimed at Earth. However, not every geomagnetic event impacts the Earth, as its magnetic field repels portions of what is thrown at it. In every 11-year solar cycle, there has been an average of 360 days of G2 events, 130 days of G3 events, 60 days of G4 events, and 4 days of G5 events. If G4 and G5 are the only events that are likely to do harm to people on the planet, this represents 64 days over 4,019 days, or a 5.8 percent chance annually, of experiencing an event that has the possibility of causing impacts (Gannon et al., 2017). According to Maffei (2023), these severe G4 and extreme G5 events create an expanded terrestrial impact or danger zone (areas with highest geomagnetically induced currents) in the geomagnetic latitudinal band

between 50 and 60 degrees. Their modeling studies show that North Dakota lay within that geomagnetic danger zone during the 1859 Carrington Event, is in that zone now, and will likely remain in the danger zone through 2070, if not beyond (See Figure 4.9.24, below). Note that the geomagnetic latitude is based on the location of the north and south magnetic poles, not the north and south poles themselves.

Figure 4.9-15: Kp8/Kp9 Events by Month, 1932-2007

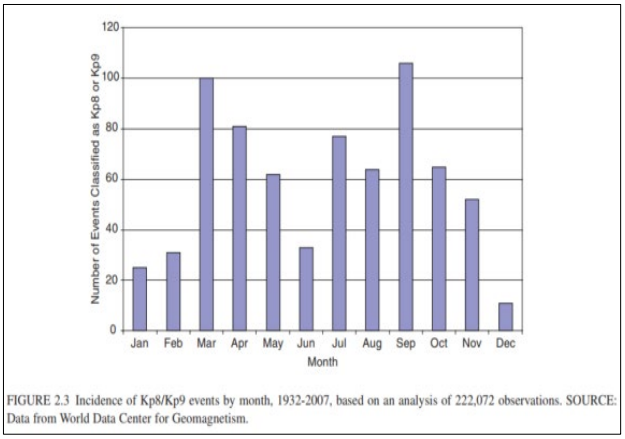


FIGURE 2.3 Incidence of Kp8/Kp9 events by month, 1932-2007, based on an analysis of 222,072 observations. SOURCE: Data from World Data Center for Geomagnetism.

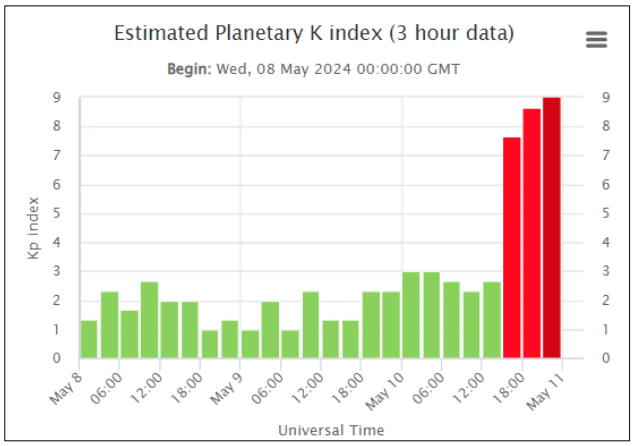
Source: National Research Council, 2008

Where the Earth is in relation to its orbit around, and angle relative to, the Sun may also help give some direction as to when impacts are more likely to occur. Looking at previous longitudinal data divided by month, as shown in **Figure 4.9-15,** September and March were the most active months from 1932 to 2007.

4.9.1.5 Warning Time and Duration

The SWPC forecasts the Kp Index at three-hour intervals, out to three days. **Figure 4.9-16** shows the estimated K Index for geomagnetic storms beginning on May 10, 2024 (SWPC, 2024). This was the *first K9/G5* solar event since October of 2003. The SWPC issues watches and warnings when the planet is experiencing elevated geomagnetic events. This occurs during G1 or higher events. There are also mandatory calls to NASA, FEMA, and NERC when agency's operations may be impacted by space weather. The SWPC reaches out with a call to the NERC regional reliability coordinators whenever the forecast is at Kp7 (G3) or higher to let electric grid operators know that the geomagnetic level is high enough that they should make sure their system is balanced and accounts for surge build up on lines (SWPC, 2023). Calls continue every three hours if the forecast remains at Kp7 or higher.

Figure: 4.9-16: SWPC Estimated K Index, 10 May 2024



Source: SWPC, 2023

Figure 4.9-17 shows the NERC Regional Reliability Councils. North Dakota is in the Southwest Power Corporation that manages 72,000 miles of transmission lines from North Dakota to Texas and New Mexico. The SWPC and NERC Reliability Coordinators host a quarterly test call to assure reliability for when an event occurs. According to Dahl (2023), these Regional Reliability Councils will be the ones deciding how to manage and section off damage before it spreads and overloads transformers.

Space weather events are viewed by telescopes, spacecraft, and satellites prior to their arrival on Earth, giving forecasters a 1 to 3-day warning, depending on angle, magnetic fields, and space conditions.

According to Hapgood (2019), the duration of these events can vary from a few hours to several days as many become multiple-events, which can be the most damaging and fastest moving.

Figure: 4.9-17: NERC Regional Reliability Councils, 2022

Source: NERC, 2022

4.9.2 Consequence and Vulnerability Loss Analysis

This section describes and discusses the consequences and vulnerabilities of space weather. A consequence is the impact that would result from the destruction or incapacitation of critical infrastructure or a critical function (FEMA EMI, 2023). Consequences can be tangible impacts to buildings or systems; intangible impacts on processes, information, or reputation; and they can include debilitating impacts, such as the loss of critical functions and data to the public. According to FEMA EMI (2023), consequences also include cascading effects that may have an impact on the functionality of critical services such as the loss of service of a utility or communications.

Vulnerability is “susceptibility to physical injury, harm, damage, or economic loss” (FEMA EMI, 2023, p. 108). It considers the extent of injury and damage that may result from a hazard event of a given intensity in a given area. This may be a geographic, social, or economic feature that makes harm from a hazard more likely or more intense.

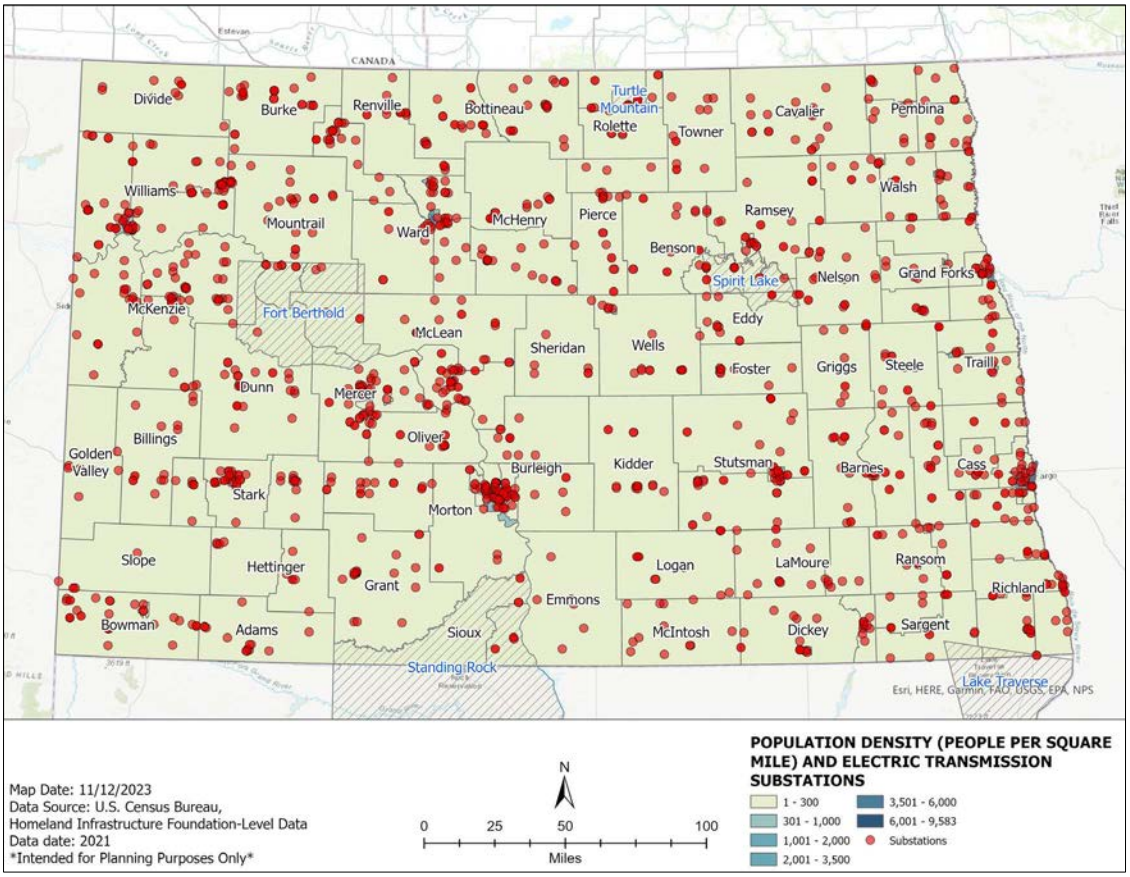
4.9.2.1 Human Loss

Most human loss from space weather would be indirect through the form of power outages and various satellite, GPS, and radio communications outages. The loss of HF radio and satellite communications impacts transoceanic aviation and polar aviation most directly.

The loss of power, especially if prolonged due to transformer damage, could lead to indirect deaths from heat or cold if a space weather event caused infrastructure damage that took significant time to repair (NERC, 2008). Wait times for these massive systems may exceed 12 months, meaning that an affected area would be without power until workarounds could be implemented.

Several local hazard mitigation plans in the state have acknowledged the complexity in returning to normal after damage to the electric grid from a space weather event. Stating that if such a loss is

Figure: 4.9-18: Population Density and Electric Transmission Substations



Source: Homeland Infrastructure Foundation-Level Data, 2021; ACS, 2023

widespread, rural areas with limited households would likely be low on the priority list for restoration of services, especially if multiple jurisdictions are in need. **Figure 4.9-18** shows the location of transmission substations and population density (American Community Survey, 2023; Homeland Infrastructure Foundation-Level Data, 2021). North Dakota has numerous substations in lightly populated areas that would likely not be a national priority for repair should a large-scale damaging space weather event occur.

In a combined severe weather/space weather event, the vulnerability presented with the elderly, children, and sick would apply, and hospitalized individuals would be at and increased risk. According to the National Research Council (2008), if an outage or internet loss impacts medical care, or generators during hot or cold events, more human suffering and indirect death could occur.

4.9.2.2 First Responders

The primary forms of communication among first responders and dispatch are not HF radio or satellite, though these are often used as backup systems or when responders are in remote areas that are unable to be reached through normal channels. They are also used in times of emergency when normal channels are disrupted. In this way, the already most-vulnerable victims of a disaster can become twice victimized. For example, solar flares were active during a 10-day period that included the day Hurricane Irma, **Figure 4.9-19**, approached the Virgin Islands on September 6, 2017. Communication had been staticky for local HF radio enthusiasts before going silent during a period when these radio users were typically actively relaying information to help responders, possibly slowing response (Bartels, 2018). According to the BBC (2022), Tonga had its undersea data cable cut by a 2022 earthquake, making it reliant on satellite internet. The loss of Starlink satellites in a space weather event that same year further weakened its link.

Figure 4.9-19: Hurricane Irma

Source: NOAA, 2017

Prior to the use of newer cellular technology there were low-technology alternatives such as phone trees, which are no longer widely available. During geomagnetic storms, cellular communications may become significantly impacted, either due to signal disruption or power loss.

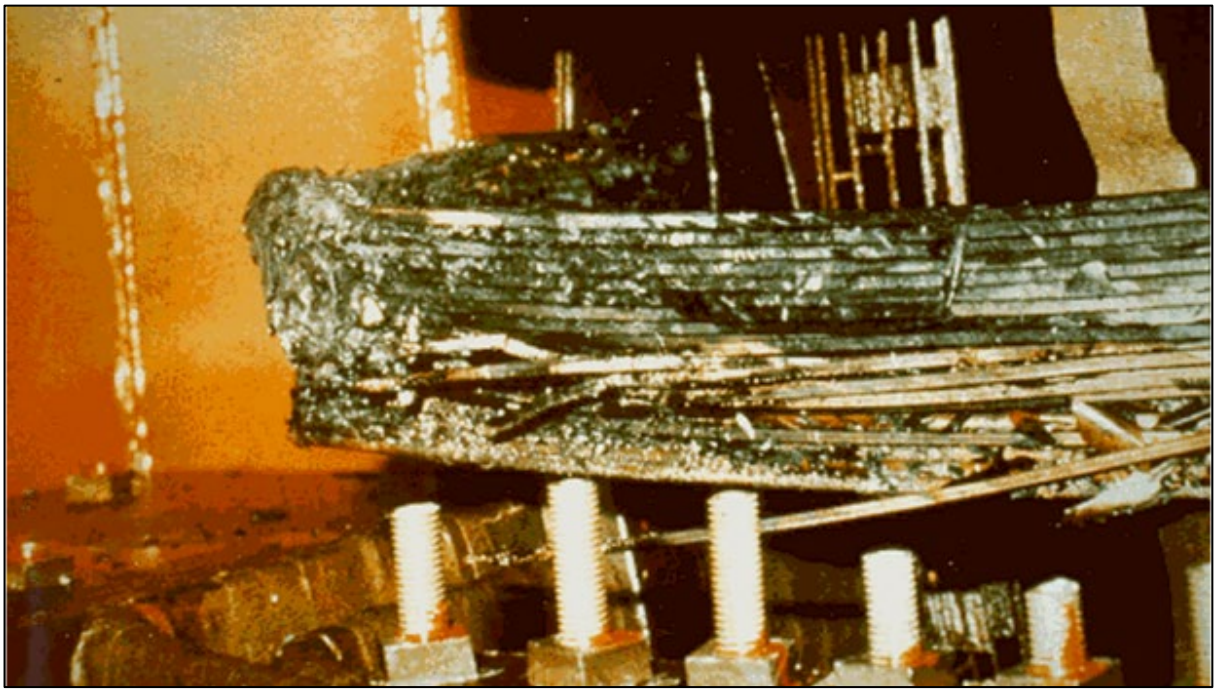
4.9.2.3 Environmental, Natural, and Cultural Resources

Space weather has been linked to pipeline corrosion. Pipelines are natural conduits of currents generated in geomagnetic storms. Furthermore, cathodic protection systems are used to inhibit corrosion by creating tension to mitigate differences between ground and pipeline magnetism. Geomagnetic events throw that balance off and speed corrosion, which can cause leakage and damage the surrounding environment. Since these leaks can occur in remote areas and sometimes well after space weather events, they are difficult to mitigate for or to fully attribute to space weather (Metz, 2023; Lanzerotti, 2010; Pirjola et. al., 2000). With North Dakota increasing the mileage, volume, types of substances transported by pipeline in the state, and by running pipeline through natural resources and sacred lands, lands near pipelines may be more vulnerable to environmental damage from pipeline corrosion due to space weather.

4.9.2.4 Property, Facilities, and Infrastructure Damage

Property, facilities, and infrastructure all run the risk of damage from space weather, especially those facilities that have electrical, or pipeline infrastructure, including sewer and water pipes that are not earthen in nature. The terrestrial critical infrastructure most at risk during a space weather event is electrical infrastructure. Power lines and transformers perform best when there is balance in the system (Das, 2012). Stronger geomagnetic storms can allow for the buildup of additional DC voltage onto either AC or DC systems. When the voltage per km exceeds 10V it can increase amperage on the lines. Higher levels, like what would be experienced in a large G4/G5 event, can be more problematic – especially when nearing 100V per km, or more, like what was experienced in southeastern North Dakota (SWPC, 2023) during a recent space weather event. Main transformers can be at risk of overheating when they exceed capacity, as occurred in New Jersey in 1989, shown in **Figure 4.9-20**. The damage can spread to any part of the system that remains connected. According to Dahl (2023), these transformers can be 200-ton machines that are built in place and have a backlog of years to replace.

Figure 4.9-20: Transformer Damage in New Jersey from Space Weather, 1989

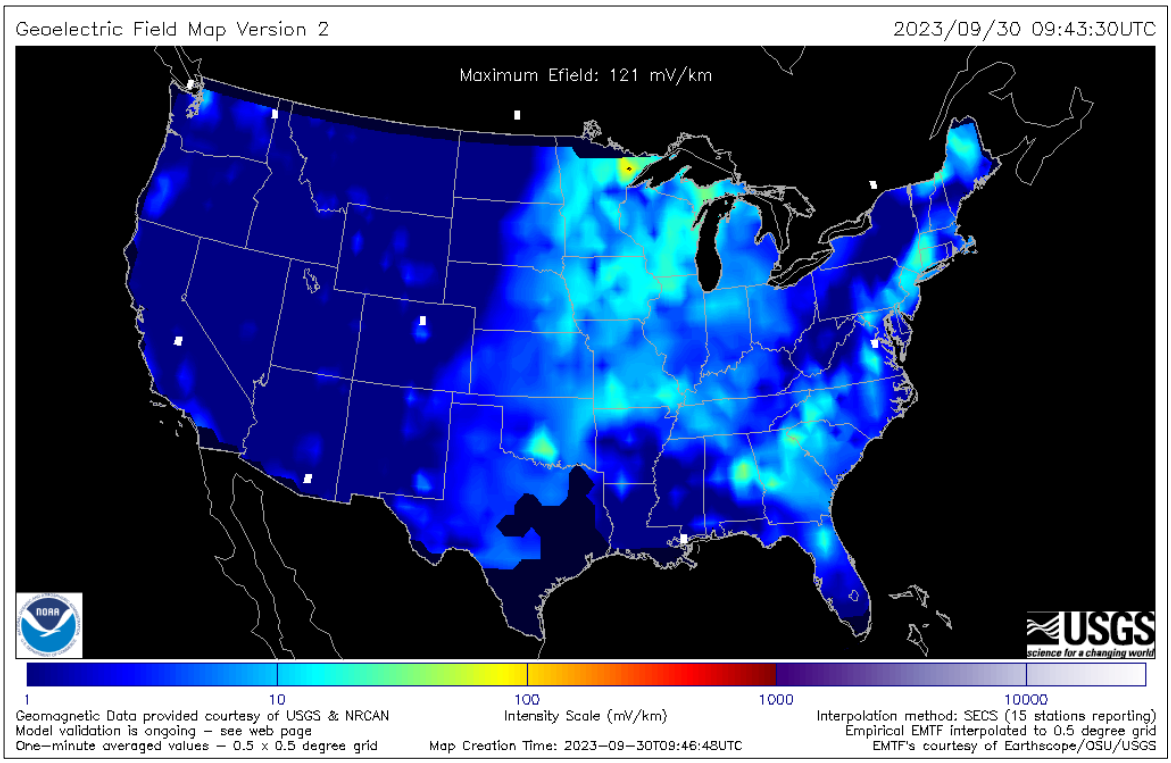


Source: SWPC, 2023

Figure 4.9-21 shows the geoelectric field of the United States during a static moment in time, September 2023, which illustrates how much current would be induced through electrical lines and other man-made conduits (SWPC, 2023). Telecommunications cables and rail lines, especially those with an electrified third rail, are also at risk as are pipelines of conducive material of all types due to their ability to host the geomagnetically induced currents and create corrosion or cause fires (Pirjola, 2000; Hapgood, 2019). Cell reception would likely be impacted by a severe geomagnetic storm, causing it to become intermittent with electrical interference. The same would occur with radio communications in aviation (Siler, 2017). Air travel, lacking communication, would be paused in impacted areas. The 2003 and 2015 storms stalled air travel in Sweden, and the FAA struggled with communications over the Atlantic Ocean in 2017 (Letzter, 2016; Dahl, 2023). Electrical outages can have cascading impacts,

causing indirect impacts to community lifelines and critical facilities. While plumbing may be unimpacted, the electricity used to operate pumps to pump water over levees or into facilities may cease to operate, leaving wastewater and water services lacking.

Figure 4.9-21: Regional Geoelectric Empirical EMTF Model



Source: SWPC, 2023

Federal operating procedures ask planners to consider how communities would operate without power for up to two weeks (FEMA, 2019).

4.9.2.5 Critical Facilities, Community Lifelines, and State Assets

The cascading impacts of power loss can negatively impact patient care and disrupt communications to first responders and security at large venues creating indirect impacts to community lifelines and critical facilities. Lack of lighting due to power loss would be problematic for large venues, including the state Capitol and most schools to operate normally.

According to FEMA (2019), hospitals working without power or on generators, will be working at a reduced capacity. Simultaneously, there are likely to be spikes in need for medical care due to the lack of electricity for home medical aid devices, increased panic, and the lack of modern conveniences and sanitation facilities, all of which may overwhelm healthcare facilities.

The loss of airflight operations due to power and/or communications losses in some areas and knock-on delays (cascading impacts) on others would produce a major disruption for aviation and bring chaos to airports, stranding travelers until conditions changed (FEMA, 2019). A lack of power means no gas and no working traffic lights, which would also hamper the transport of aid from outside the affected area.

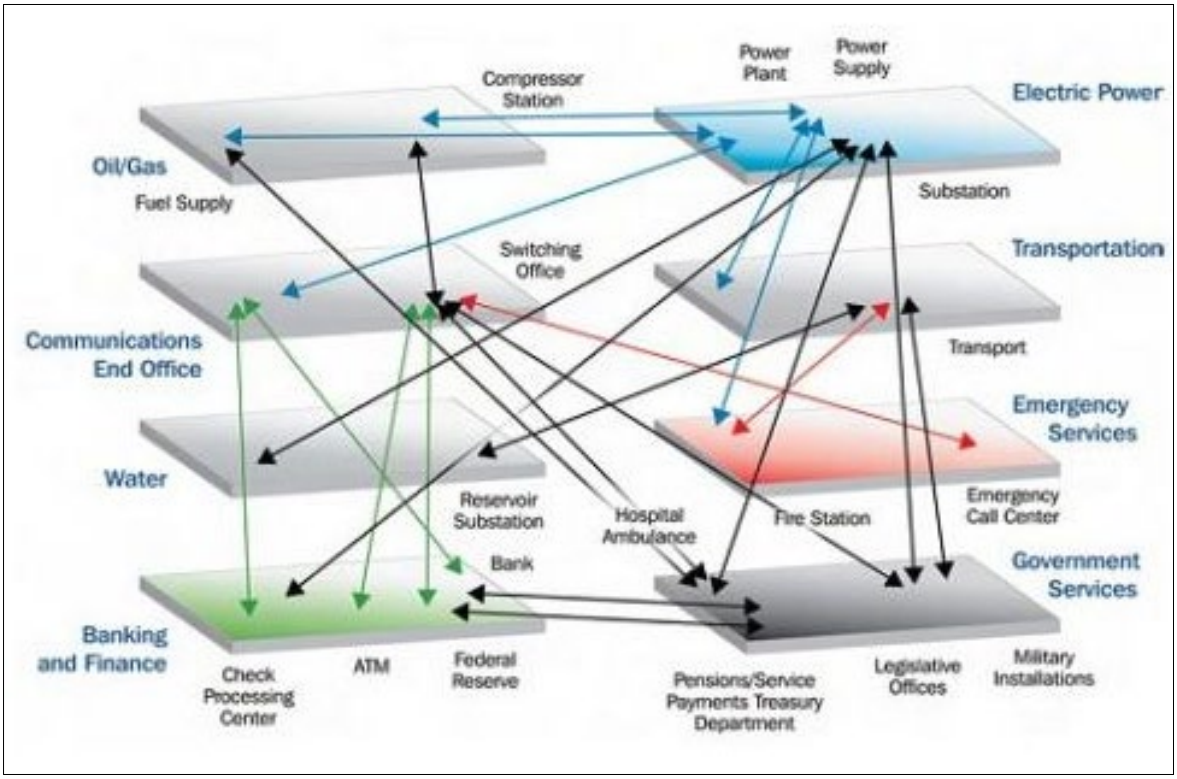
4.9.2.6 State Economy and Economic Disruption

Direct impacts to economic activity include those economic activities that are reliant on electricity or high precision GPS. North Dakota's industry sectors utilize technology such as precision directional drilling, which occurs in Western oil patches, and precision fertilizer and pesticide placement and irrigation, which occurs in central and eastern North Dakota (Dahl, 2023). Both industries are reliant on railway and/or pipeline distribution, which may be impacted as well. Even a G3 event has paused drilling in Canada due to GPS disruption (Pultarova, 2023), and a long-term pause from a larger event in North Dakota could lead to impacts in production and wages in the industry.

Many businesses rely on basic electricity to function. Restaurants and grocery stores rely on refrigeration to keep food safe from bacteria. Bars and coffee shops require refrigeration to keep drinks at preferred temperatures for serving. In line with FEMA operations guidelines (FEMA 2019) retail shopping for clothes or durable items may be possible without electricity, but would be difficult without lighting, heating, cooling, or functioning tills. Credit and debit card transactions would not work, and electric gas pumps would not operate, (Practical Engineering, 2022). Water must be boiled for consumption as well, impacting business across sectors. These were the impacts of the Blackout of 2003 in the easter U.S. and Canada and Texas winter blackouts and would likely occur in a similar space weather-caused blackout (Practical Engineering, 2022).

Figure 4.9-22 is a Homeland Security-produced graphic that examines the interconnectedness of sectors from the National Infrastructure Protection Plan (2012). It shows the cascading effects that can be felt from the loss of power in the upper-right extending into all sectors of the economy and government.

Figure 4.9-22: Interconnectedness of Public and Economic Sectors



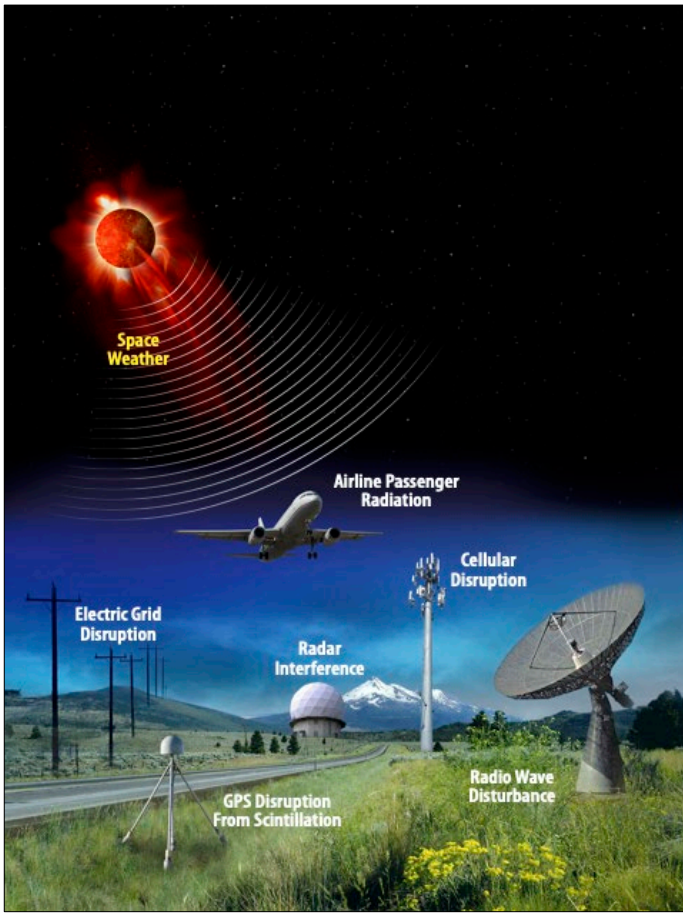
Source: U.S. Department of Homeland Security, 2012

4.9.2.7 Delivery of Service and Continuity of Operations

While many hazards can be overcome by keeping people in place and leveraging the remote operational tools with which people are now largely familiar, remote operations would not be a feasible alternative in a mass blackout situation. Computers have limited life, and internet connections may suffer from disruptions during space weather.

Delivery of sanitation services and potable water may be hampered by the loss of electricity. Rural wells, urban water systems, and treatment plants require electricity to operate effectively, and a lengthy loss of power will render these services unusable. According to FEMA, (2020), the loss of gasoline pumps and credit-card processing may also limit the ability for state or federal resources to be deployed for assistance, depending on the geographical range of the power outage.

Figure 4.9-23: Possible Effects of Intense Solar Activity



Source: Hrybyk-Keith/NASA Goddard Space Flight Center, 2021

Figure 4.9-23. The ramifications of what may be lost extra-terrestrially from a large event are even bigger. According to FEMA, (2020), the loss of satellites could impact national security, impact GPS effectiveness, and disrupt communications and broadcasting both locally and across the nation. The oil and agricultural industries in North Dakota rely heavily on GPS, as do first response agencies.

4.9.2.8 Public Confidence in the State's Governance

One of the primary roles of government during a space weather event is to maintain public confidence. This is done by communicating the possibility of such an unavoidable event and by ensuring there are effective communication strategies in place during and after an event. At a minimum, such strategies must communicate to everyone how long the impacts will continue and their extent.

The most vulnerable people in such a scenario are those who are already disconnected from government messaging by choice or by lack of effective communication. This includes language isolation groups and the blind and deaf. Many deaf residents are reliant on messaging that may experience intermittent outage issues during space weather events.

In a catastrophic and geographically large impact area, this challenge may be great. Normal means of communicating via broadcast, the Emergency Alert System, and the internet may be unavailable to the

public when power is lost, and public reaction to the loss and lack of information about the return of electricity would be difficult to predict.

4.9.2.9 Estimation of Annual Losses

A 2017 study estimated potential economic losses due to electrical transmission failure and its cascading impacts in the United States. Four geographically dispersed Geomagnetic Disturbance (GMD) scenarios were run through a space weather simulated event model, with North Dakota included in two of those scenarios. The results indicated a $7 billion to $48.5 billion total global loss with a $6.4 billion to $41.5 billion domestic loss (Oughton, et. al, 2017). Based on population alone, the North Dakota portion totaled $242 million in damage from an extreme G5 event.

In the probability section, it was discussed that the likelihood of a G4 or G5 event occurring, from the Sun's perspective is 64 days every 11 years, or a 1.6 percent chance annually. Looking only at G5 events, vulnerability drops to only 4 days every 11 years, or 0.0995 percent chance per year. Using the probability of 4 days per 11 years and $242 million in estimated damage, the estimated annual loss in North Dakota would average approximately $238,865, in 2017 dollars.

Not factored into this calculation is the possibility of the Earth's magnetic field or its orientation deflecting part of the event, which will vary by time of day and season of the year. In any case, we can be certain that North Dakota has an overall high average vulnerability (Maffei, 2023), should such an event occur. Prior studies (Colton, 2022) have shown that ND often has a high ratio of transformer capacity to usage, which is positive as it relates to being able to withstand the additional charges in the system brought on by a space weather event. However, North Dakota is in the danger zone as regards vulnerability or exposure to potentially damaging geomagnetic storms.

4.9.2.10 Community Resilience

There are steps that state and electric grid operators can take to help defend against the impacts of space weather, including adding in new technology like Faraday cages, or GIC (Geomagnetic Induced Current) Blockers, that protect equipment from surges and installing more geomagnetic-resistant transformers into the grid, but these steps are timely and expensive (WAPA, 2023). Upgrading to three-phase transformers, which are less susceptible than other designs, is an option, but their size makes them impractical in rugged and remote areas. Merely replacing older transformers with newer ones appears to make a difference as recent failures were largely in older equipment when newer equipment sustained the same surges. Series capacitors, which are expensive and require support structures, have also successfully reduced or blocked surges. Switching from electro-mechanical to microprocessor relays may have allayed the Quebec outage in 1989 (Government Accountability Office, 2018). The state can partner with local utilities in seeking infrastructure grants to make these upgrades.

With an extensive and growing pipeline network, the state can also make sure that pipeline operators are aware that natural pipeline degradation is sped up during strong geomagnetic storming. State officials can suggest operators perform a maintenance check and be advised that they are at an increased risk of corrosion and leaks (appearing immediately or after prolonged natural degradation). According to Metz (2023), the state could advise the adoption of post- G4/G5 inspection protocols or digital radiography to limit leaks due to space weather.

4.9.2.11 Future Conditions

Through the end of this century in North Dakota, future climate conditions are not expected to directly impact the occurrence of space weather events, though indirectly the extent, Intensity, and frequency of hazard related impacts could potentially increase. The following list summarizes information extracted from the NOAA National Centers for Environmental Information summary for North Dakota (Frankson, 2022), the Fifth National Climate Assessment (Knapp, 2023), and related resources:

- **Location**: Space Weather is a threat throughout the state and should remain so.
- **Extent/Intensity**: Climate change should not directly impact the extent or intensity of space weather events, but it could affect the level of impacts through indirect means.
- **Frequency**: Climate change should not directly impact the frequency of space weather events, but it could affect the level of impacts through indirect means.
- **Duration**: Climate change is not expected to impact the duration of space weather events.

Space weather (cosmical meteorology) is a term used to describe those phenomena that lie wholly or in part outside of the Earth's atmosphere (AMS, 2023), and includes the study of planetary atmospheres and solar-weather relationships (NOAA/SPWC, 2023). The Australian Bureau of Meteorology further identifies that space weather as referring to changes in the space environment and the effects that those changes have on mankind's activities (BOM, 2023). The primary source of space weather is the Sun, and variation in the electromagnetic and particulate output of the Sun is the main cause of changes in the Earth's upper atmosphere and surrounding regions such as the magnetosphere. These affect communications, navigation and many other space and ground-based systems. Secondary sources would be of cosmic (outside our solar system) origins.

According to Gehrels (1994), research has historically revealed two areas in which space weather might influence global climate change, both of which are pertinent to North Dakota. The first relates to the small variations in total solar radiation to long term climatic effects and is now well documented by satellite cavity radiometers, over many years (Balasubramaniam, 1998; Haigh, 2007). The second, entirely unrelated to solar flux variations, has been the investigation of impacts by kilometer size bodies (asteroids and comets) on the Earth's surface.

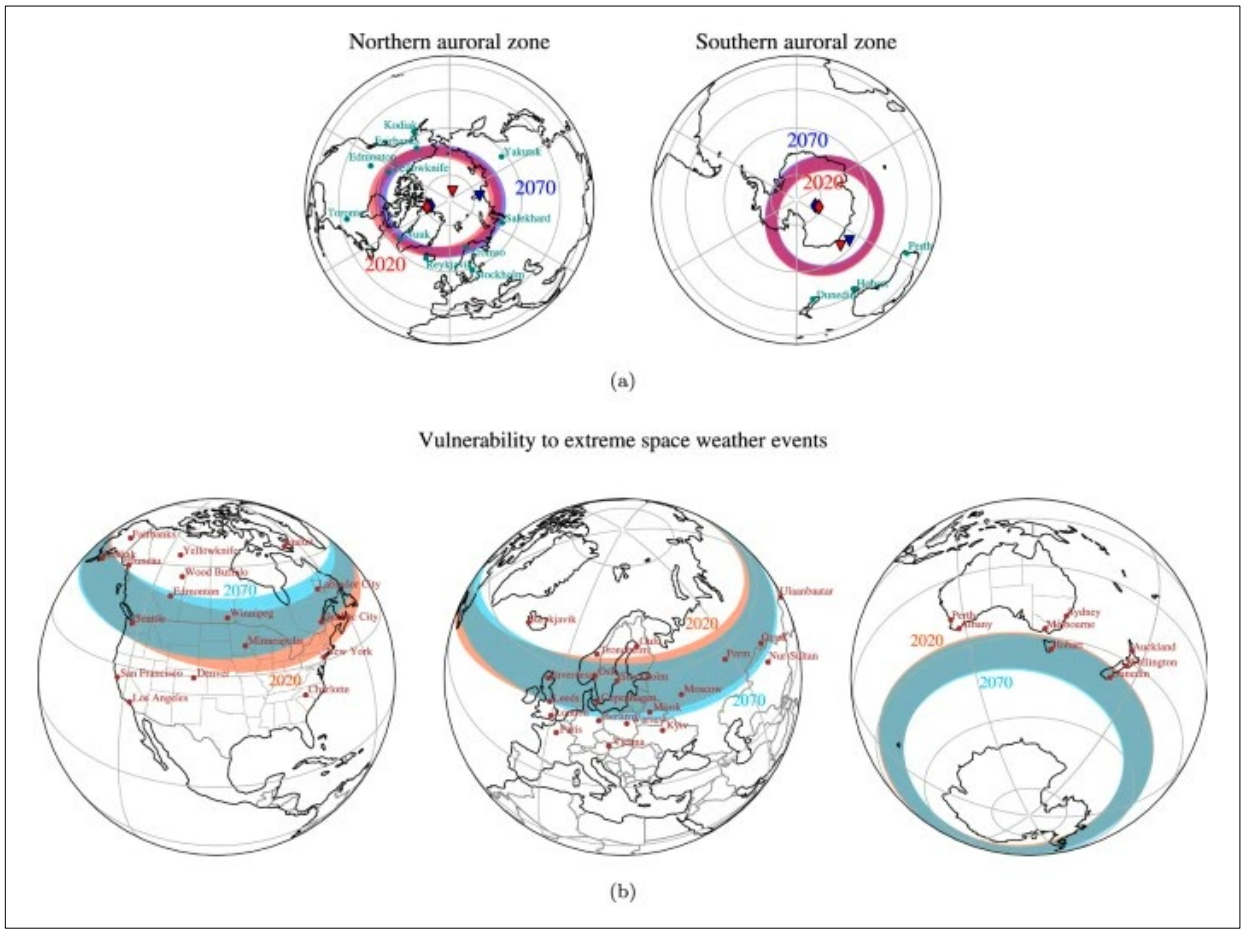
> The electronic systems of the CHI St. Alexius Health in Dickinson, CHI St. Alexius Health clinic in Beach, Coal Country Community Health Center, Sanford Health Clinics, Richardton Health Center and Clinic, Evergreen, Dickinson Country House, Hilltop Home, Able Inc, St. Benedicts Health Center, St Luke's Home, and Golden Valley Manor are not hardened to withstand such an event. *(Billings-Dunn-Golden Valley-Stark Counties Multi-Jurisdictional Hazard Mitigation Plan, 2020)*

A third area where space weather might soon impact terrestrial climate change relates to the current trends in migration of the magnetic north and south poles – this is especially pertinent to northern tier states including North Dakota. Referred to as magnetic declination, the location of the magnetic North Pole has historically varied in location among the islands of far northcentral Canada, between 69N and

77N, or as much as 1450 miles (2334 km) south of the geographic North Pole, through measurements dating from 1590 through 1983 (NCEI, 2023; USGS, 2023). However, NCEI historic magnetic declination mapping indicates that the magnetic North Pole has rapidly migrated northward since the 1980s. It appears to have crossed near the North Pole from 2017 through 2018 and is now dropping southward on the Siberian side of the pole, towards Komsomolets Island, between the Laptev and Kara Seas.

Though some authors have postulated that such motion and the resultant variations in the Earth's magnetosphere only affect the ionosphere (Buis, 2021), there is a growing field of research which investigates the impacts of solar storms on tropospheric weather phenomena that could directly impact ND (Kampolis, 2022; Zhang et al., 2012). **Figure 4.9-24** depicts a) the 2020 and projected 2070 locations of the north and south polar Aurora Zones and b) the Modeled Vulnerability to Extreme Space Weather (G5) Events for various regions of the globe (Maffei, 2023). The reddish (2020) and bluish (2070) geomagnetic latitudinal bands depicted in part b are the areas most exposed to severe space weather events, or "danger zones". Note that North Dakota is centered within those danger zones both now and through the next 50 years, and likely beyond (Maffei, 2023). Research is still ongoing as to the potential effects of these recent changes on seasonal storm tracks and long-term climate.

Figure 4.9-24: Modeled Vulnerability to Extreme Space Weather Events



Source: Maffei et al., 2023

The impact of terrestrial climate on space weather is not as well understood and the expectation is that any climate change occurring on Earth would not have much, if any, impact on space weather at least from an incoming solar radiation perspective. However, according to Tinsley (2004) and Haigh (2007) space weather is and will continue to be a primary climate influence on Earth, in the long term (gross solar input, energy balance) and the short term (influence of CMEs, etc.), and how energy transfers down from the Ionosphere, stratosphere, and into the tropopause - even influencing storm intensity. As we can see, any such changes will likely have direct influences on life in North Dakota.

4.9.2.11.1 Extreme Climate Variability and Climate Change

Through the end of this century North Dakota's natural yet extreme climate variability will continue to be the primary influencer or signal within each natural hazard (Frankson, 2022). This will directly or indirectly impact areas and people across the state over days to decades long timescales, while the much more subtle and gradual trends of climate change over the rest of this century act to extend the range of such variability (Knapp, 2023). And such studies show that both trend and variability could extend beyond that which has previously been documented in the historical record.

Recent climate change trends have shown, and future projections suggest that the state can expect continued gradual warming in all seasons, with greatest warming in the winter season. Overall precipitation is likely to increase, but with a high degree of inter-seasonal and interannual variability, which could lead to longer and stronger droughts interspersed with more frequent and more intense flooding (Swain, 2015). Severe summer and winter season storms will continue to occur in both drier, drought-prone periods, and wetter, flood-prone periods within the state's overall extreme climate variability.

Until recently, there has been little research into how terrestrial weather, climate, and/or climate change might cause upwelling in the Earth's upper atmosphere and potentially affect near-earth particle components, charges, and radiative properties, and thus impact space weather. In Japan, "the Project for Solar-Terrestrial Environment Prediction (PSTEP)" has provided synergy between basic science and the space weather forecast process (Kusano et al., 2020, P.1). Research is currently underway on the application of a GAIA (Ground-to-topside model of Atmosphere and Ionosphere for Aeronomy) lower and upper atmosphere coupled physical model (Tao et al., 2020). So far it has demonstrated the ability to feed Global Climate Model (GCM) information into upper atmosphere models, with a promise for future use in space weather forecasting for application in managing and protecting North Dakota's critical infrastructure.

4.9.2.11.1.1 Impact

Extreme climate variability and potential climate change poses an increased threat to area power grids, satellite and terrestrial communications infrastructure, and other critical facilities. Projected increases in heavy snow and ice, wildfires, or extreme winds across the state (Easterling, 2017) will likely increase damages to local power lines, power transmission towers, and communications towers, as well as linked portions of these grids located far from North Dakota (EPA, 2023). Likewise, increased flooding (Swain, 2015) will likely lead to increased impacts to underground power and communications lines, along with surface transportation and petroleum storage tanks. There is a potential for increased (compounding) impacts from space weather hazard phenomena in these and related areas.

4.9.2.11.1.2 Adaptation

There are no direct impacts expected by climate change on space weather activities in the Northern Great Plains region, so there are no specific adaptation actions other than those already suggested as part of this or other hazards.

4.9.2.11.1.3 Mitigation

There are no direct impacts expected by climate change on space weather activities in the Northern Great Plains region, so there are no specific mitigation actions other than those already suggested as part of this or other hazards.

4.9.2.11.2 Other Changes

Future climate and space weather is something of a conundrum as it is known that solar radiation is the primary source of energy for our terrestrial system (De Wit et al., 2010) and that variability in that radiation and the forms in which it reaches the Earth affects climate on time scales of minutes to millions of years (Kumar & Singh, 2019). Plus, there is considerable research ongoing as to the respective roles of those fluctuations in solar radiation on our Earth-atmosphere system, along with increasing levels of greenhouse gases, various natural geo-physical factors such as volcanism, and anthropogenic factors such as long-term land-use changes (IPCC/WG1, 2023). Solar variability, or changes in the levels of solar radiation as well as in the number and size of sunspots with 11- year cyclic variation, is likely to affect climate on time scales of minutes to millions of years (Kopp et al., 2018). There is also recent evidence that the planets themselves are impacting solar variability through the gravitational effects of their combined planetary orbits (Cionco et al., 2023). According to Scafetta et al. (2023), this induces subtle oscillations in Earth's orbit and its climate system.

According to USAR (2005) and Aribigbola (2013), most civil disturbance, crime, or terrorist activity results from societal reasons such as economic hardship, social injustices, ethnic differences with long-standing oppression by a group of people toward another, objections to world organizations or certain governments, political grievances, and terrorist acts. Future climate projections through the end of the century do indicate the potential for increased societal insecurities and instabilities (Hoegh-Guldberg, 2018), including places like the Northern Great Plains region as exemplified by recent Dakota Access Pipeline (DAPL) civil unrest and criminal activity (Powys-Whyte, 2016; Levin, 2016; EELP, 2023). According to the NFPA (2021), increased levels of social unrest or disorder could lead to more events where concurrent space weather hazards add an increased level of impacts.

According to FEMA (2019), new transformer technology and drone-operated monitoring could help increase the ability of North Dakota's electrical system and pipelines to withstand the currents from space weather and more quickly identify issues in pipelines.

4.9.3 Risk Analysis

Risk can be defined as the potential for loss of or damage to an asset (FEMA EMI, 2023). This section analyzed the potential for loss or damage in the state of North Dakota.

4.9.3.1 National Risk Index

The National Risk Index does not evaluate this hazard.

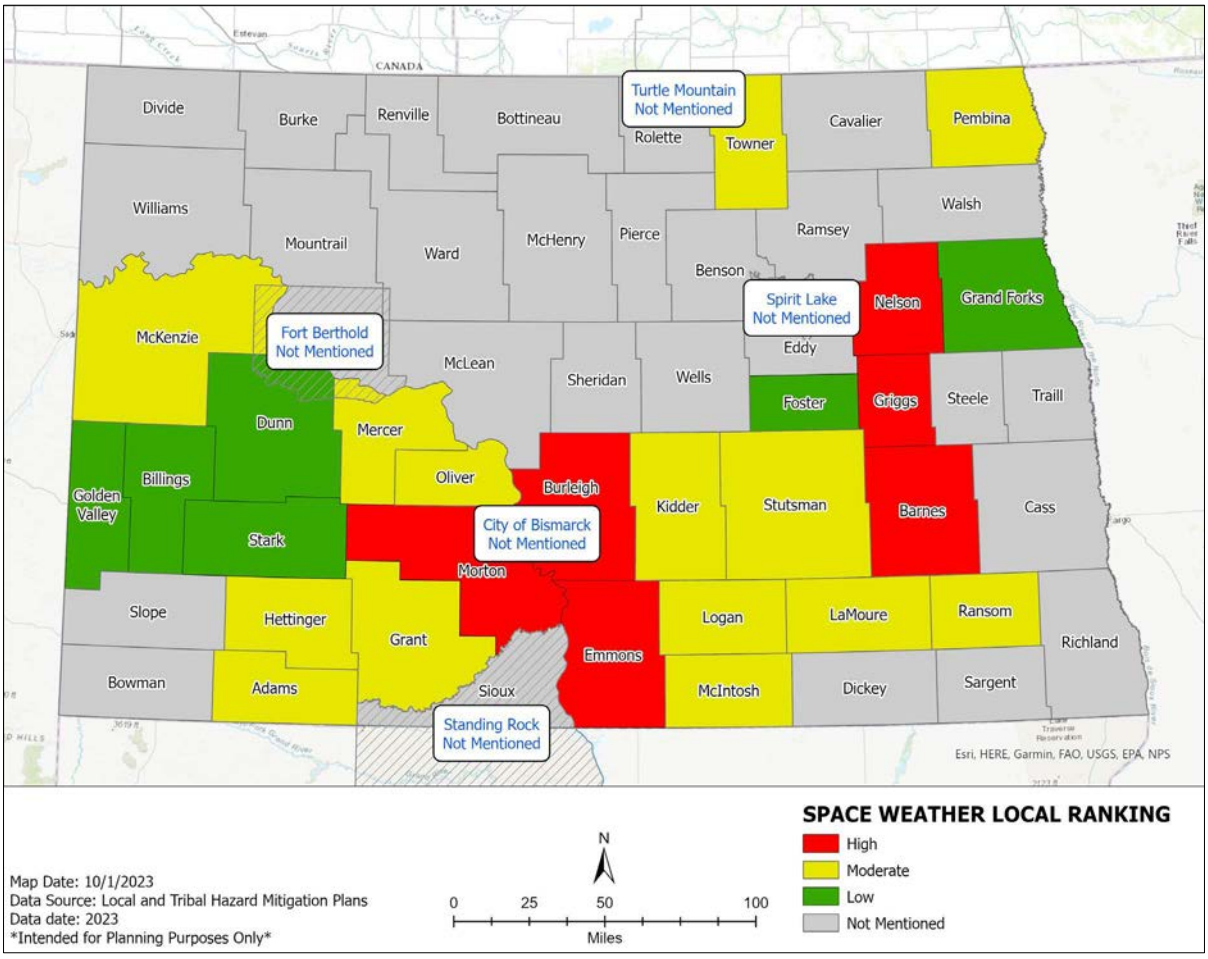
4.9.3.2 Risk Index Score

The Priority Risk Index for this plan update ranks space weather as a moderate risk with a score of 2.2. This ranks the same as criminal attacks and hazardous materials release for the lowest moderate-risk hazard, ranking it tied for 9 out of 15 hazards.

4.9.3.3 Jurisdictions at Risk

When evaluating local and tribal mitigation plans, 26 of 58 jurisdictions with adopted plans identify space weather as a hazard impacting their jurisdiction, as shown in **Figure 4.9-25**. Of all these plans that have ranked hazards, 14 considered space weather a moderate risk.

Figure 4.9-25: Local and Tribal Hazard Mitigation Plans Rating Space Weather



Source: Local and Tribal Hazard Mitigation Plans, 2023

4.9.4 Summary/Conclusion

The following bullets summarize highlights and conclusions related to space weather.

- Most space weather poses a threat primarily to users of specialized GPS technology, HF radio communications, or upper-latitude avionics over a brief period and limited geography, though stronger events generally produce impacts over expanded areas.
- North Dakota is far enough north that it is more at risk for impacts from stronger space weather events than most states, and in the danger zone for severe G4 and G5 geomagnetic events.
- A severe G4 or G5 geomagnetic event could do significant damage to the electrical infrastructure, hinder communications, and cause massive blackouts across the state.
- The SWPC works with regional council coordinators when geomagnetic levels reach G4 levels to assure that levels are being monitored to avoid overloading and serious damage and outages.
- There is limited certainty and limited time available for warning about upcoming large events. Significant space weather eruptions from the Sun can be observed from one to three days in advance, but the severity and timing of what will impact Earth can by estimated less than a day before those consequences are felt.
- In the event of a severe space weather event, the loss of normal communications and electrical power will complicate communications with the public and other emergency agencies.
- Power outages from transformer damage may be long-lasting, and if occurring in connection with extreme heat or cold, may lead to increased human suffering and possible loss of life.
- In the event of a severe G4 or G5 storm, loss of precision GPS applications and eventual pipeline corrosion are two areas of industrial impacts that will hit North Dakota hard.
- Opportunities exist to work with pipeline operators to assure they are aware of events that may impact the durability of their systems.
- North Dakota's annualized loss from severe space weather events is estimated at around $238,865.00.
- Newer industrial technology for grid infrastructure is costly, and sometimes bulky, but can increase grid resilience.

4.9.5 Data Limitations

There is a great deal of unknown science involved in the prediction of space events. There are just two spacecraft that are focused on relaying information to scientists about solar flares and geomagnetic storms and they are very near Earth. The orbit of the Earth is such that both spacecraft are not always able to simultaneously monitor the sun, thus compromising the ability of space weather forecasters to make accurate and timely forecasts. Even with clear data and forecast tools operating at their best, forecasting is just a few days out at best, which gives local and state agencies limited time to plan or mobilize for potential space weather impacts in their respective areas.

4.10 Criminal Attack

4.10.1 Overview

This section examines the risks posed by a significant criminal attack that warrants the state to deploy resources to supplement localities in North Dakota. These risks might include a mass shooting, hostage situation or substantial organized criminal activity. This hazard may have overlaps with terrorism and/or civil disturbance and for a full overview of the risk of other adversarial threats are explored in sections 4.4, 4.13, and 4.14.

4.10.1.1 Description

According to the International Committee of the Red Cross, (2023), International law identifies a criminal attack as an "act of violence against the adversary, whether in offense or defense and in whatever territory conducted," or as an "attack by physical force on a person for which the attacker is liable to criminal prosecution."

Criminal attacks that the state and federal governments may get involved in include mass shootings, gang activity, drug activity, human trafficking and hate crimes.

Fentanyl use is rising in North Dakota. data indicates that around 124 North Dakotans die each year of overdoses. The majority (60.0 percent) of drug overdose deaths are from opioid misuse, with synthetic opioids such as fentanyl the leading cause of drug overdose deaths (FBI, 2011; Lynn, 2015). Between January 2022 and November 2022, there were 121 overdoses and 18 deaths in the Bismarck-Mandan area (KFYRTV, 2023). See Tables 4.10-12 and 4.10-13 for statewide totals.

A wide range of activities can be categorized as criminal attack. The North Dakota Attorney General's Office compiles crime data through the North Dakota Incident-Based Reporting (ND-IBR) program. These data are available for public access through the North Dakota Crime Statistics online interface at https://crimestats.nd.gov/tops/. According to these data as published in the Crime in North Dakota report (Weltz, 2019-2023), there was a sizeable increase in overall crime in both 2020 and 2021, with a sizeable decrease in crime in 2022, even though the state's population grew in each year of the period. By 2022, the crime rate (per 100,000 persons) appears to have settled back below the 2020 levels.

Figure 4.10-1: North Dakota Crime Statistics Summary, 2018-2022

Year	Population	Crime Total	% Change from Previous Year	Rate per 100,000 Pop.
2018	760,077	48,188	0.1%	6339.9
2019	762,062	47,871	-0.7%	6281.8
2020	765,309	49,579	3.6%	6478.3
2021	774,948	51,784	4.4%	6682.3
2022	779,261	49,488	-4.4%	6350.6

Source: Weltz, 2019-2023

Criminal attacks occur most often at the local (city or county) or tribal levels. These entities can request support from other local agencies via mutual aid, and through various state, and federal agencies. Depending on the need and request the following state agencies may be asked to assist:

- North Dakota Highway Patrol,
- North Dakota Bureau of Investigation, to include a regional drug task force,
- North Dakota Game and Fish,
- North Dakota Parks and Recreation,
- North Dakota Department of Corrections and Rehabilitation,
- North Dakota National Guard, at the direction of the Governor (ND Century Code, 2013).

According to Ahmed (2022), The Gun Violence Archive defines mass shootings as "an incident in which four or more people are shot or killed, excluding the shooter". Gang activity may gain the attention of state and federal agencies and multi-jurisdictional task forces (Federal Bureau of Investigation (FBI), 2011). The FBI categorizes gang activity into four categories – criminal street, prison, one-percenter outlaw motorcycle gangs, and neighborhood. A description of each is shown in **Figure 4.10-2**, below.

Figure 4.10-2: Four Categories of Criminal Gangs

Gang Type	Description
Street	Street gangs are criminal organizations formed on the street operating throughout the United States.
Prison	Prison gangs are criminal organizations that originated within the penal system and operate within correctional facilities throughout the United States, although released members may be operating on the street. Prison gangs can continue their criminal operations outside the confines of the penal system.
One Percenter OMGs	ATF defines *One Percenters* as any group of motorcyclists who have voluntarily made a commitment to band together to abide by their organization's rules enforced by violence and who engage in activities that bring them and their club into repeated and serious conflict with society and the law. The group must be an ongoing organization, association of three (3) or more persons which have a common interest and/or activity characterized by the commission of or involvement in a pattern of criminal or delinquent conduct. ATF estimates there are approximately 300 One Percenter OMGs in the United States.
Neighborhood/ Local	Neighborhood or local street gangs are confined to specific neighborhoods and jurisdictions and often imitate larger, more powerful national gangs.

Source: FBI, 2011

Drug activity is typically defined by the types of drug offenses that occur. A drug offense refers to the possession, use, sale or furnishing of any drug or intoxicating substance or drug paraphernalia, which is prohibited by law (FBI, 2023). The FBI defines Drug Abuse Violations as the violation of laws prohibiting the production, distribution, and/or use of certain controlled substances and the equipment or devices utilized in their preparation and/or use. The North Dakota Office of the Attorney General (2023) reports that drug and narcotic violations in the state have decreased by 15.1 percent from 2018 through 2022.

Human trafficking is defined by the North Dakota Attorney General's Office as "a crime involving the exploitation of someone for the purposes of compelled labor or a commercial sex act through the use of force, fraud, or coercion." Since 2015, the state has convened a North Dakota Human Trafficking Task Force that includes local, state, and federal law enforcement, prosecution and social services working on reducing the impact in the state. The North Dakota legislature makes funds available to organizations working toward ending human trafficking (Attorney General's Human Trafficking Commission, 2019). The state of North Dakota recognizes three forms of human trafficking – sex trafficking, human smuggling, and labor trafficking.

The State of North Dakota's hate crime law focuses narrowly on certain types of hate crimes, but the United States Department of Justice identified hate crimes more broadly as "crimes committed on the basis of the victim's perceived or actual race, color, religion, national origin, sexual orientation, gender, gender identity, or disability" (Department of Justice, 2023). Hate crimes became part of standard state reporting in 2020. Drug related activity is a major concern for law enforcement and communities across all parts of the state.

During an NDDES-sponsored outreach effort, in collaboration with NDHHS, with the LGBTQ2S+ community, group members identified concerns related to a criminal act of terrorism or a mass shooting incident due to the historical acts of targeted violence. Individuals expressed concern for the safety of their community and the risk factors intertwined into laws related to healthcare access. This shows the gap in equity when factoring in the whole community. *Source: NDHHS, 2023*

Northeastern University's School of Criminology and Criminal Justice joined with USA Today and the Associated Press to track all mass killings (4 or more victims) in the United States since 2006 (USA Today/AP/Northeastern University, 2023). The database identifies North Dakota as tied for 38th with 3 mass killings during that time – 2011 when a Minot oilfield worker killed the mother of his child, her brother, her mother and her mother's boyfriend; 2012 when a New Town man murdered a grandmother and three of her grandchildren; and 2019 when four people were shot and stabbed in Mandan as described in the next section.

4.10.1.2 Previous Occurrences

The following section describes notable and recent events of criminal attacks in the state of North Dakota.

- In July 2013, 10 to 20 members of the Country Boy Crips street gang relocated from Bakersfield, CA, to Dickinson amid the oil boom (Lynn, 2015). Violent crimes in western North Dakota were the immediate result, including a revenge shooting in Minot in July 2013, and a 22-arrest drug sting in 2015. Gang violence can range greatly in impact and magnitude.
- 2019 - Josiah Thomas Aguilar of Dilworth, MN, Nicholas May of Fargo, and Abbot "Boogie" Aho of Fergus Falls, MN, were among several members of the "Slither Gang" who were sentenced in 2021 for their roles in a large string of robberies (Taylor, 2021). Their street gang primarily targeted other drug traffickers across the state, robbing them of drugs, money and guns, and reselling drugs they had stolen.
- 2013 – 2020, An increase in outlaw motorcycle gang activity in western North Dakota was an outcome of the influx of oil labor and led to an increase in federal law enforcement resources to

the region. These gangs have been tied to drug trafficking, prostitution, and murder (Baumgarten, 2019; Bikers News, 2020). Jack Sjol was a Williston rancher, murdered by a contract killer reportedly hired by the Sons of Silence in 2013. The gang was also identified in a 2020 Mandan, the stabbing of a Hells Angels gang member, and the 2015 homicide of a Devils Lake woman.

- In 2019, an incident involved veteran and local chiropractor Chad Isaak shooting and stabbing four employees to death at his mobile home park management office in Mandan. Isaak was sentenced to life in prison for the incident (KFYRTV, 2021). A jury deliberated four hours, finding Isaak guilty of four counts of murder, burglary, concealment within a vehicle, and unauthorized use of a vehicle in the murders of William Cobb, Lois Cobb, Adam Fuehrer, and Robert Fakler. Isaak died in prison by suicide in 2022.
- In October of 2020, Anthony Raymond, a Proud Boy member, was arrested for threatening to bomb a polling location in Stark County, ND (Villareal, 2020). He sent the threat to the local newspaper anonymously, but law enforcement tracked him through his IP address.
- On January 7, 2021, Drew Wrigley, U.S. Attorney for the District of North Dakota, announced charges against 26 defendants involved in Operation Blue Prairie, a drug pipeline connecting individuals in Detroit, Michigan, to the Spirit Lake, Turtle Mountain, and Fort Berthold Indian Reservations in North Dakota (DEA, 2021). Drug Enforcement Administration (DEA) agents worked alongside members of the FBI, the Bureau of Indian Affairs, U.S. Marshals Service and state, local and tribal law enforcement agencies in furtherance of this investigation.
- In 2021, a Minneapolis man who directed a drug conspiracy from the Grand Forks County Correctional Center has been sentenced to 17 years in federal prison (U.S. Attorney's Office, 2023). Eason was arrested on state drug charges and held in Grand Forks County Correctional Center. From October 2021 to February 2022, Eason used the jail's communication facilities to arrange shipments of methamphetamine and fentanyl from Arizona to distributors in Fargo, Moorhead, MN, and elsewhere (U.S. Attorney's Office, 2023).
- In 2022, a four-month Drug Enforcement Administration (DEA) investigation into drug trafficking in central North Dakota resulted in the seizure of more than 11,000 fentanyl pills (Valley News Live, 2022). ""The individuals we've arrested and those under investigation are specifically targeting people on the reservations of North Dakota," DEA Omaha Division Special Agent in Charge Justin C. King said. "In turn, lives are being destroyed, families are torn apart, and communities are stretched to their breaking point. With this in mind, it's important that we continue educating our families and friends on the deadly consequences of this toxic drug" (Valley News Live, 2022). This crime was busted under the One Pill Can Kill initiative from DEA.
- In September 2022, the International Market Plaza on Main Avenue in Fargo, ND was targeted with white nationalist messages three times in three months. On these dates, the words "Patriot Front" were spray-painted across walls, windows, and art murals, one of which celebrated the immigrant neighborhood (Hagen & Morris, 2022). Vandals had targeted other immigrant businesses, along with recreation grounds, schools, and apartments in the area.
- On May 13, 2023, Canadian Cameron Monte Smith was suspected of shooting at an electrical substation near Ray, ND, and spray-painting messages against the Dakota Access Pipeline (Nicholson, 2023; Rahman, 2022). The action led to a power outage for 243 people and millions of dollars in damage.

- On July 14, 2023, Mohamad Barakat killed one law enforcement officer and wounded two others after initiating an exchange of gunfire with officers who were responding to a car crash in Fargo, ND. Barakat also wounded a civilian before he was killed by one of the responding officers. Although the measure of a mass killing is four or more people and this event did not qualify, Barakat's Internet search history indicated that he intended to do more harm to more people, had amassed weapons, and had researched a local street fair (Mayorquin, 2023). Law enforcement officers found numerous explosives and weapons in the car and believe that Barakat's decision to stop near the car accident kept him from reaching his intended target.
- In 2023, Devonsha Dabney a/k/a Kemell, age 29, of Detroit, MI, appeared before Chief Judge Peter D. Welte, U.S. District Court, Fargo on October 10, 2023, for his leadership in a drug trafficking organization targeting two of North Dakota's Native American Reservations and throughout the state of North Dakota to include other major hubs (U.S. Attorney's Office, 2023). Thousands of pills were distributed across the state including oxycodone and fentanyl-laced pills (Bismarck Tribune, 2023). Drug traffickers may target Native American lands and population due to the perceived lack of law enforcement on tribal land. Dabney pled guilty to Continuing Criminal Enterprise and admitted to forfeiture allegations involving U.S. Currency, jewelry, and more.
- Hoax bomb and active shooter threats to schools continue to occur throughout the state, and are reported to the FBI (NDSLIC, 2023).

4.10.1.3 Location and Extent

Criminal attack can occur anywhere, including a residence. Mass attacks, such as shooting, are more likely to occur where there is a gathering of people with the potential to be victims. This was noted in the search history of the perpetrator in the July 2023 Fargo, shooting incident, who apparently intended to arrive at a large public event, but instead opened fire on police and firefighters responding to a traffic crash (Mayorquin, 2023). This makes community events, schools, and large work sites more at risk than other locations, although anywhere where there are four or more people is a potential mass attack site.

Project Safe Neighborhoods is a nationwide program from the U.S. Department of Justice that is focused on reducing gang and gun crimes (U.S. Department of Justice, 2023). It identifies more than 30 active gangs in the state, and most of the gang activity occurs in Fargo, Grand Forks, Minot, Bismarck and on Native American Reservations in the state. Smaller areas are not insulated from gang activity.

Gang problems in rural areas versus urban areas are often very different (Howell, 2006). Youth neighborhood gangs tend to be the problem in rural areas, and these gangs tend to be less prone to violent crime, and include a wider range of race, gender, and class among membership. Gang-related crimes and the persistence of problems generally increase in largely populated cities.

Figure 4.10-3 shows the counties with the highest number of drug cases per 1,000 residents in 2022 and the statewide reported totals for the year (North Dakota Crime Statistics, 2023). This list combines data for all law enforcement agencies exclusive to the county and places multi-county task forces within the statewide data. For a complete list, see Appendix E.10.2, and a complete breakdown by law enforcement agency see Appendix E.10.3 (North Dakota Crime Statistics, 2023). Urbanized areas and western North Dakota had higher rates of cases and arrests.

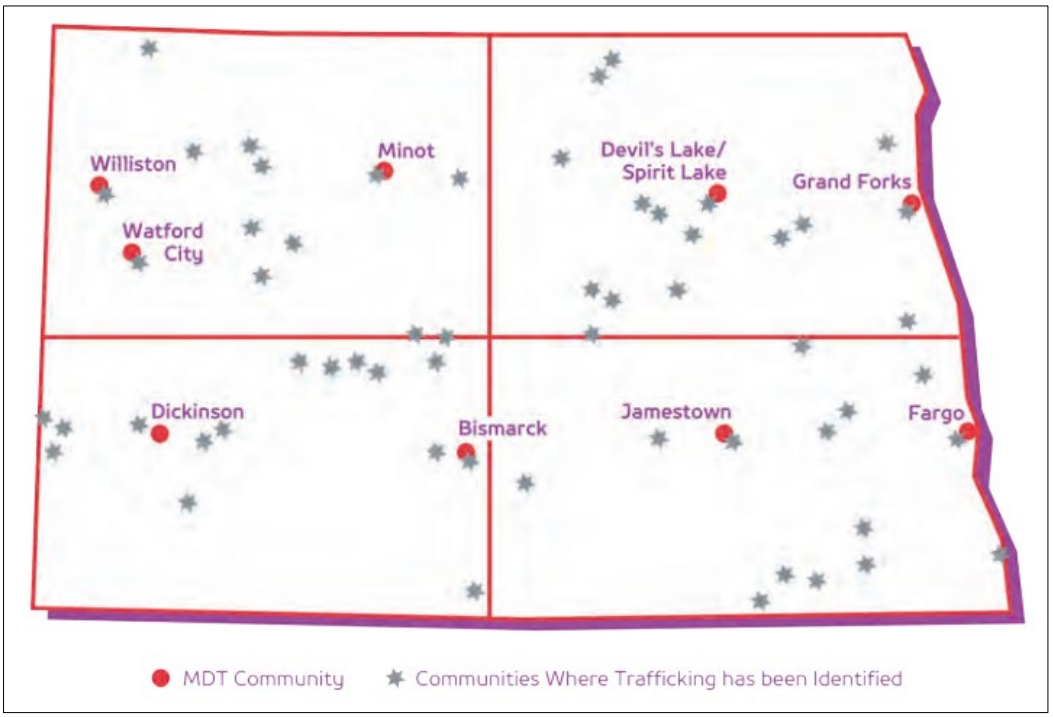
Figure 4.10-3: Jurisdictions with Most Drug Cases Per 1,000 Residents, 2022

County	Drug Cases	Drug Arrests	Cases Per 1,000	Arrests Per 1,000
Williams	607	343	15.78	8.92
McKenzie	140	76	10.17	5.52
Burleigh	987	741	10.08	7.57
Ramsey	106	92	9.11	7.91
Mercer	72	46	8.57	5.47
McLean	75	56	7.66	5.72
Dunn	29	14	7.15	3.45
Mountrail	69	51	7.10	5.25
Barnes	76	52	6.99	4.78
Cass	1264	559	6.91	3.05
Statewide	**5,865**	**3,736**	**7.58**	**4.83**

Source: North Dakota Crime Statistics, 2023

Human trafficking is monitored by the North Dakota Human Trafficking Task Force (NDHTTF). The 2020 report provides locations where there are known human trafficking victims and where there are multi-disciplinary teams (MDTs) to help victims (AG's Human Trafficking Commission, 2020). The map at **Figure 4.10-4** shows that human trafficking cases occur throughout the state, including in rural areas.

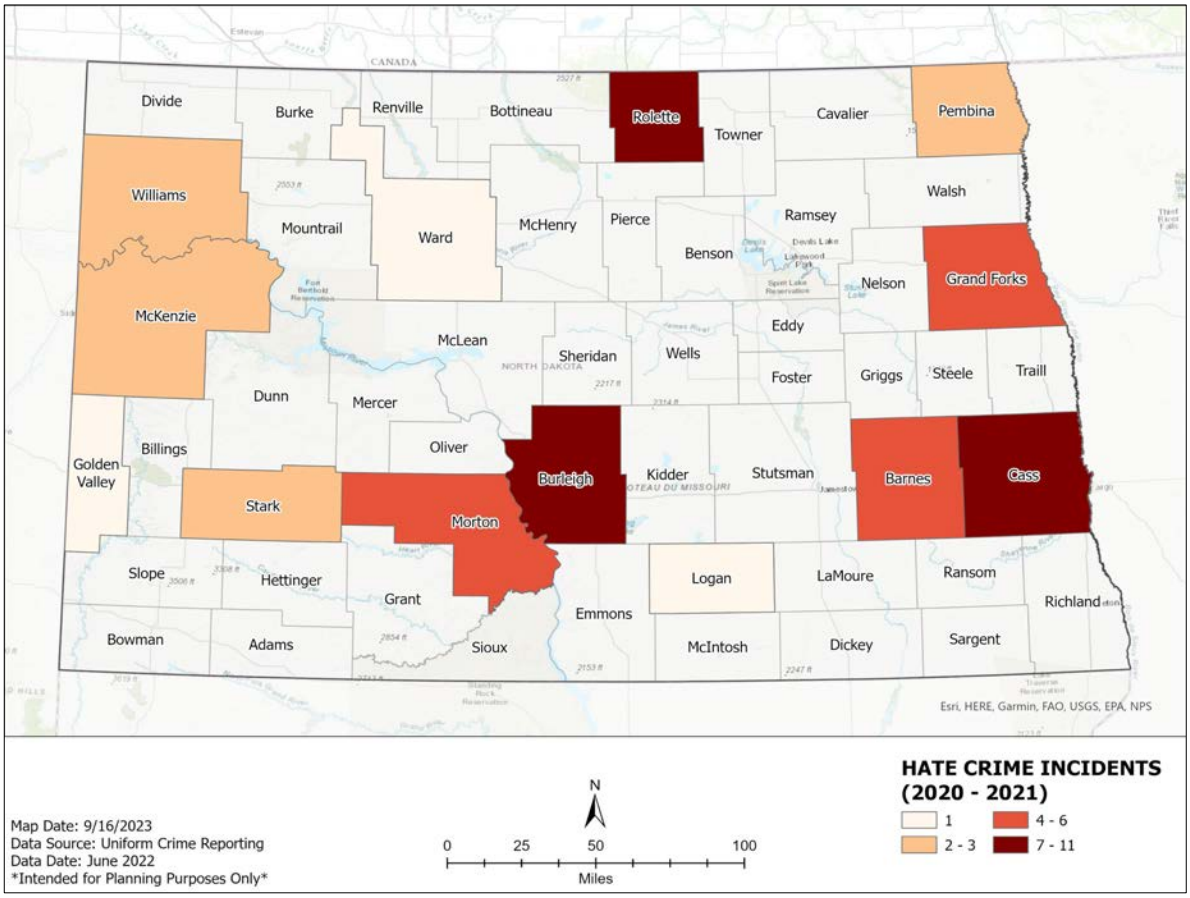
Figure 4.10-4: Human Trafficking Cases and Resources, 2020



Source: North Dakota Human Trafficking Task Force, 2020

Figure 4.10-5 shows the sites for reported hate crimes in the state of North Dakota, for 2020 and 2021. During this period, Cass (11) and Rolette (11) led the state in hate crimes, with Burleigh (10), just behind (NDHTTF, 2020). While Cass and Burleigh are population centers that should have a higher number due to population, Rolette has a relatively small population less than 10 percent of Cass. Barnes County, with five incidents, also stands out has having a higher proportion of hate crimes relative to its population of around 10,000.

Figure 4.10-5: Hate Crimes in North Dakota, 2020-2021



Source: Uniform Crime Reporting, 2023

The National Incident-Based Reporting System (NIBRS) collects standard data from across the nation, as reported by local, state, tribal, and federal law enforcement agencies, as part of the Uniform Crime Reporting (UCR) Program (FBI, 2023). The Uniform Crime Reporting Program is administered by the U.S. Department of Justice through the Federal Bureau of Investigation (FBI) and the Bureau of Justice Statistics (BJS). The Bureau of Justice Statistics analyzes the data and releases its findings annually (BJS, 2023). Data is easily available dating back to 2016, which allows for comparison of recent years to a longer trend.

Figure 4.10-6 shows the breakdown of location and targeted group of reported hate crimes by local law enforcement unit. The Turtle Mountain Agency (TMA) and the City of Fargo rise to the top when the data is evaluated at the local level. The TMA reported all 11 of the Rolette County's cases, and all of them were related to Race/Ethnicity/Ancestry (BJS-Uniform Crime Reporting, 2021). Cass County's cases all came from Fargo but were spread across race/ethnicity/ancestry, sexual orientation, and gender identity. Bismarck had the highest number of reported hate crimes for sexual orientation. Williston and Golden Valley were the only agencies to report religious hate crimes. These statistics are supported by findings from the outreach strategy associated with this plan.

Figure 4.10-6: Hate Crimes by Locality and Victim, 2020-2021

Law Enforcement Agency	Race/Ethnicity/ Ancestry	Religion	Sexual Orientation	Gender identity	Total
Fargo	8	0	2	1	11
Turtle Mountain Agency	11	0	0	0	11
Bismarck	3	0	5	0	8
Mandan	4	0	1	0	5
Valley City	5	0	0	0	5
Grand Forks	3	0	1	0	4
Dickinson	3	0	0	0	3
Williston	2	1	0	0	3
Pembina	2	0	0	0	2
Golden Valley	0	1	0	0	1
Lincoln	0	0	1	0	1
Napoleon	1	0	0	0	1
Watford City	0	0	1	0	1
Univ. of North Dakota	1	0	0	0	1
Burleigh	1	0	0	0	1
Morton	1	0	0	0	1
McKenzie	1	0	0	0	1
Ward	1	0	0	0	1

Source: BJS-UCR, 2023

Figure 4.10-7. At an even more localized level, the State Attorney General's Annual *Crime in North Dakota* (Weltz, 2020-2023) Reports identify the top five locations for crimes against people, as shown for the plan update period. Residences, Roads, Retail Stores, Parking Lots and Hotels were the top five in varying order in each year, with Residence and Roadways being 1 and 2, respectively, each year.

Figure 4.10-7: Top Locations for Crimes Against People 2019-22

2019	2020	2021	2022
Residence	Residence	Residence	Residence
Road	Road	Road	Road
Retail Stores	Retail Stores	Parking Lots	Retail Stores
Parking Lots	Parking Lots	Hotel/Motel	Parking Lots
Hotel/Motel	Hotel/Motel	Retail Stores	Hotel/Motel

Source: Weltz, 2020-2023

Figure 4.10-8 gives an overview of the spatial extent of criminal attacks. Public and First Responders face the largest threat from criminal attacks. However, property, the environment and the state economy can all be impacted by a perception or true increase in crime in general.

Figure 4.10-8: Spatial Extent for Criminal Attacks

Resource	Extent
Public	Statewide
First Responders	Statewide
Delivery of Service and Continuity of Operations	Limited
Property, Facilities, and Infrastructure	Limited, some vandalism
Environment	Limited
State Economy	Limited

4.10.1.4 Probability

Both the State Attorney General's Office and the Bureau of Justice Statistics track crimes across the state. The impacts of crime victimization on society will be discussed in section 4.10.3.

Figure 4.10-9 shows some overall statistics about crimes in the state as reported to the Attorney General (Weltz, 2020-2023). Generally, the crime rate is relatively stable: around 6,450 crimes per 100,000 North Dakotans, with case clearance rates around 42 percent. About 4,000 juveniles offend in the state each year.

Figure 4.10-9: Crimes in North Dakota, 2019-22

Measure	2019	2020	2021	2022	Annualized
Crimes Against Persons per 100,000 population	6,281.8	6,478.3	6,682.3	6,350.6	6,448.3
Total Offenses	47,871	49,579	51,784	49,488	49,680.5
Percent Cleared	46.1	41.9	40.2	41.9	42.5
Total Arrests	32,489	29,407	28,672	28,915	29,870.8
Juvenile Arrests	4,152	3,408	4,057	4,246	3,965.8
Offenses per Incident	1.25	1.23	1.25	1.23	1.24

Source: Weltz, 2020-2023

Figure 4.10-10 shows crimes against people in the state as reported to the Attorney General and the percentage of cases cleared during the plan update period broken down into crime type. The worst year statistics between 2019 and 2022 and the annualized rate for the period are shown in the figure (Weltz, 2020-2023).

Figure 4.10-10: Crimes Against People in North Dakota, per 100,000 citizens, 2019-2022.

Offense	Worst Year				Annualized		
	Year	Reported	Year	Pct Cleared	Reported	Cleared	Pct Cleared
Murder/Nonnegligent Manslaughter	2022	50	2019	100.0%	31.25	25	80.0%
Negligent Manslaughter	2022	13	2019	100.0%	8.75	6.5	74.3%

Aggravated Assault	2022	1,448	2021	60.3%	1,347.75	799	59.3%
Simple Assault	2021	6,904	2019	53.0%	6,494	3277.25	50.5%
Intimidation	2022	1,975	2019	55.6%	1,735	870.5	50.2%
Stalking	2021	614	2022	18.2%	578.5	81.5	14.1%
Kidnapping/Abduction	2022	149	2020	68.1%	129.75	82.5	63.6%
Rape	2022	379	2019	24.6%	346.25	72.75	21.0%
Sodomy	2020	50	2020	34.0%	45.25	13.5	29.8%
Sexual Assault with an Object	2019	12	2021	42.9%	9	2.5	27.8%
Fondling	2021	635	2019	25.2%	566.75	132	23.3%
Incest	2022	10	2022	30.0%	7	1.5	21.4%
Statutory Rape	2022	70	2022	38.6%	66	22.25	33.7%
Commercial Sex Acts	2020	11	2021	28.6%	7	1.5	21.4%
Involuntary Servitude	2020	2	2020	50.0%	0.5	0.25	50.0%

Source: Weltz, 2020-2023

For most violent crimes, there was an increase in crimes reported over the update period and a decrease in clearance rate, although the change over time was small. Simple Assault followed by Intimidation and Aggravated Assault were generally the most common. There were 50 cases of Murder/Nonnegligent Manslaughter during the update period and an 80 percent clearance rate.

Figure 4.10-11 shows the annualized rates for 2019 to 2022, compared to the longer period of 2016-2021 so that relative change in risk can be discussed (BJS-UCR, 2023). Generally, crime rates have been increasing in recent years. Gambling Offenses (44.4 percent or 1.3 more crimes per 100,000 annually) and Animal Cruelty (39.2 percent, or 28.8 more annually) had the largest increase during the update period. Extortion/Blackmail (30.5 percent, or 11.8 more crimes per 100,000 annually), Bribery (29 percent, or 0.7 more annually), Homicides (21.6 percent or 28.8 more annually) and Arson (20.3 percent or 15.5 more) also experienced at least a 20 percent increase in offenses. Offenses that decreased were property crimes or crimes against society.

Many gangs are active in the illegal drug market (Kaiser Family Foundation, 2023). Illegal drug possession, purchase, and use is a crime, that while not against others, often fuels activity and criminal activity that destroy families. Reservations and other rural communities like those in North Dakota have become targets for gangs trafficking drugs due to the influx of income from oil labor and casinos and the lack of recreational activities competing for the excess income (FBI, 2011; Lynn, 2015).

Figure 4.10-11: Uniform Crime Reporting Crime Trends, per 100,000 citizens, 2016-2021.

Offense Category	Annualized 2016-2021	Annualized 2019-2021	Annual Change
Animal Cruelty	73.5	102.3	28.8
Arson	76.2	91.7	15.5
Assault Offenses	7,845.7	8,429	583.3
Bribery	2.3	3	0.7
Burglary/Breaking & Entering	2,684.5	2,740.3	55.8

Counterfeiting/Forgery	839.7	794.3	-45.3
Destruction/Damage/ Vandalism of Property	4,570.2	4,539.7	-30.5
Drug/Narcotic Offenses	8,691.7	8,721	29.3
Embezzlement	127.3	110.7	-16.7
Extortion/Blackmail	38.8	50.7	11.8
Fraud Offenses	2,696.3	2,979.3	283.0
Gambling Offenses	3.0	4.3	1.3
Homicide Offenses	20.8	25.3	4.5
Human Trafficking	6.7	7	0.3
Kidnapping/Abduction	106.7	112	5.3
Larceny/Theft Offenses	11,361.7	11,019.3	-342.3
Motor Vehicle Theft	1,752.8	1,840.3	87.5
Pornography/Obscene Material	174.3	205.3	31.0
Prostitution Offenses	45.8	37.3	-8.5
Robbery	172.2	170.3	-1.8
Sex Offenses	952.0	971.3	19.3
Stolen Property Offenses	596.8	658.0	61.2
Weapon Law Violations	648.3	641.7	-6.7
Total	43,487.3	44,254.3	767.0

Source: BJS-UCR, 2023

Figure 4.10-12 shows illegal drug use statistics in the state of North Dakota in 2021. The data indicates that around 124 North Dakotans die each year of overdoses. The majority (60.0 percent) of drug overdose deaths are from opioid misuse, with synthetic opioids such as fentanyl the leading cause of drug overdose deaths (Kaiser Family Foundation, 2023). Between 3 and 4 percent of North Dakotans acknowledged opioid misuse over the course of a year. Between January 2020 and December 2021, there were 145 deaths in North Dakota from opioids alone. These numbers have been rapidly increasing since 2013, as the availability of narcotics has expanded.

Figure 4.10-12: Illegal Drug Use in North Dakota, 2021

Drug Overdose Death Rate (per 100,000 population), 2021	17.2
All Drug Overdose Deaths, 2021	124
Opioid Overdose Deaths, 2021	74
Natural and Semisynthetic Opioids (e.g., oxycodone, hydrocodone), 2021	17
Synthetic Opioids, other than Methadone (e.g., fentanyl, tramadol), 2021	57
Methadone and Heroin, 2021	N/A
Opioid Overdose Deaths as a Percent of All Drug Overdose Deaths, 2021	60.0%
Past Year Opioid Misuse, 2018-2019	3.6%

Source: Kaiser Family Foundation, 2023

Figure 4.10-13 shows drug seizures by drug type as reported by the North Dakota Attorney General from 2018 to 2022 (North Dakota Attorney General, 2023). Marijuana (47.6%) and amphetamines/ methamphetamines (30.2%) were the most commonly seized drugs in the state, representing 77.8 percent of all drugs seized during the plan update period.

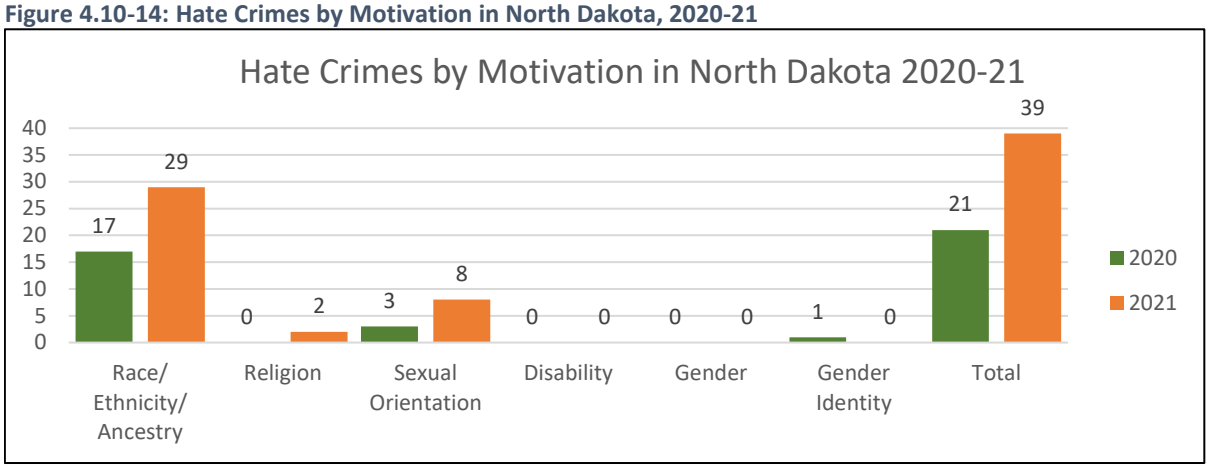
Figure 4.10-13: North Dakota Drug/Narcotic Seizures, 2019-2022

Drug Type	2018	2019	2020	2021	2022	Total
Marijuana	4,271	3,651	3,391	3,463	3,206	**17,982**
Amphetamines/ Methamphetamines	2,407	2,498	2,215	2,410	1,880	**11,410**
Other Drugs	273	253	271	345	473	**1,615**
Other Narcotics	249	290	274	291	347	**1,451**
Heroin	292	325	355	296	93	**1,361**
Unknown Type of Drug	162	166	143	180	129	**780**
Hashish	103	126	137	198	116	**680**
Other Depressants	109	81	109	149	128	**576**
Cocaine	118	110	116	99	123	**566**
Other Hallucinogens	79	111	109	124	53	**476**
Opium	52	29	25	85	118	**309**
Other Stimulants	58	45	43	60	44	**250**
LSD	30	25	38	29	13	**135**
Crack Cocaine	9	16	15	15	31	**86**
Barbiturates	11	6	11	16	10	**54**
Morphine	14	14	11	11	2	**52**
PCP	0	0	0	1	1	**2**

Source: Office of Attorney General, 2022

Figure 4.10-14 shows hate crime data reported to the FBI by the targeted victim. This data indicates that race, ethnicity, and ancestry, followed by sexual orientation are most likely to motivate hate crimes in the state. The Bismarck Tribune was able to identify several hate crimes that went unreported as such. While two years is hardly enough to determine a trend, there was a near doubling of incidents between 2020 and 2021. This may also reflect better data reporting (U.S. Commission on Civil Rights, 2019; Bureau of Justice Statistics, 2023). Race, ethnicity, ancestry, and sexual orientation have slightly higher proportions of victimization than the national rates those years; religion was lower (Novotney, 2023). Similarly, the increase in North Dakota exceeded the 12 percent national increase in hate crimes.

Figure 4.10-14: Hate Crimes by Motivation in North Dakota, 2020-21



Source: Bureau of Justice Statistics, 2023

4.10.1.5 Warning Time and Duration

With few exceptions, there is little warning about crime because if there were warnings, it would likely be met with law enforcement. Duration of an individual criminal attack is often quick, ending when law enforcement or another citizen intervenes. Crime sprees and organized crime may persist with multiple crimes for years replacing individual actors.

4.10.2 Consequence and Vulnerability Loss Analysis

This section describes the consequences and vulnerabilities of a criminal attack. Both consequences and vulnerability will be discussed in this section.

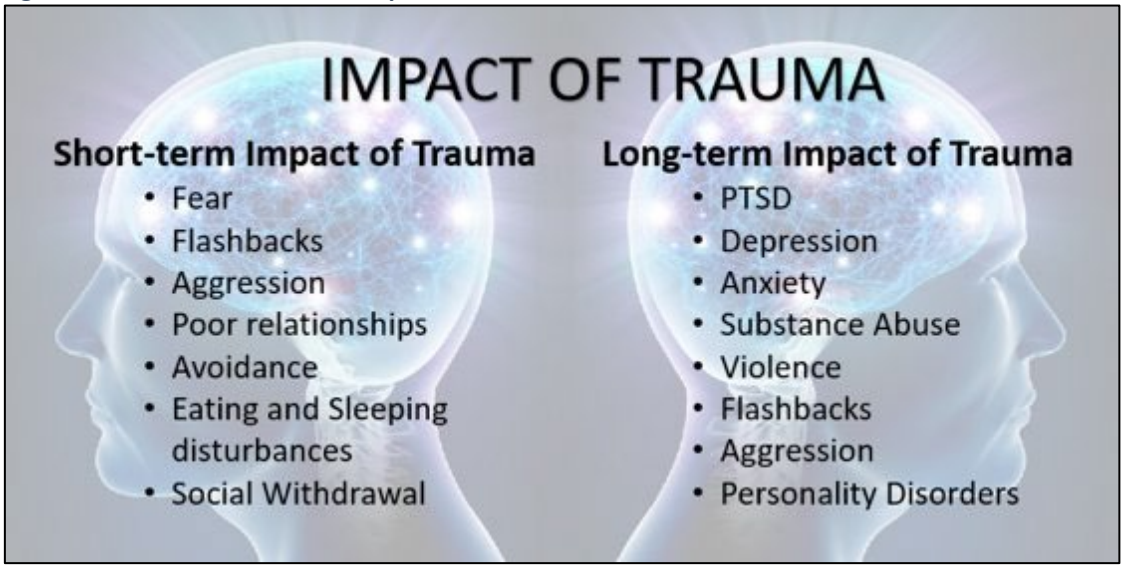
A consequence is the "degree of debilitating impact that would be caused by the incapacity or destruction of critical infrastructure or a critical function" (FEMA EMI, p. 1564). Consequences can be tangible impacts to buildings or systems or intangible impacts on processes, business, or reputation. Consequences include debilitating impacts, such as the loss of critical functions, data, or public confidence. It also includes cascading effects that may influence the functionality of critical services such as the loss of service of a utility or communications.

Vulnerability is "susceptibility to physical injury, harm, damage, or economic loss" (FEMA EMI, 2023, p. 108). It considers the extent of injury and damage that may result from a hazard event of a given intensity in each area. This may be a geographic, social, or economic feature that makes harm from a hazard more likely or more intense.

4.10.2.1 Human Loss

Beyond physical victimization, violent crime can have lingering and compounding impact on victims. **Figure 4.10-15** shows the range of socio-emotional impacts experienced by violent crime victims as reported by the Bureau of Justice Statistics (Langton and Truman, 2014).

Figure 4.10-15: Socio-emotional Impacts of Violent Crimes on a Victim



Source: Ficcadenti, Catholic Charities, 2019. Reprinted with permission.

In addition to the emotional and physical impacts shown, victims reported a high rate of trouble at work and school and relationship problems. The report indicates that the relationship to the perpetrator had an impact, with a known perpetrator creating more impact than a stranger. Robbery, weapons, and injury all increased the likelihood of problems.

According to the Centers for Disease Control and Prevention (CDC), suicide is the ninth leading cause of death in North Dakota, followed by Chronic Liver Disease/Cirrhosis often catalyzed by alcohol consumption (CDC, 2023). Diseases of despair, or deaths of despair, refer to the impact of drug overdose, suicide, and alcohol abuse on people and communities who experience prolonged despair due to social or economic circumstances (Sterling & Platt, 20221). Deaths from these three conditions have risen to such an extent that they are now cited as a major contributor to the recent decline in overall life expectancy in the United States (Statista, 2023). Historically underserved populations may be more vulnerable to the impacts of these conditions. The impacts of these deaths may impact individuals, families, and the overall resilience and well-being of a community.

June 2019, North Dakota was the topic of a U.S. Congressional Committee on Civil Rights and an Advisory Memorandum the following September about hate crimes that recognized that the state ranked high in hate crimes per capita. It cites under-reporting, low law enforcement participation in hate crime reporting training, and inadequate state laws (U.S. Commission on Civil Rights, 2019). The federal government identified crimes that were Islamophobic, anti-Native American, and anti-Lesbian, Gay, Bisexual, Transgender, Queer or Questioning and Two-Spirit (LGBTQ2S) among those that went unreported.

Crime is an ever-present shaper of Western society. It has consequences for our economy, the way taxes are spent, and our media, which in turn affects our decisions about voting, jobs, and interactions with each other. A feeling that the public lacks acceptance has often been identified as the motivation for mass shooters (Canter and Youngs 2016). Acceptance into a society can provoke criminality as well. Criminality of one type has a correlation with adopting additional criminal behavior because of the exposure to a criminal network and the existing motivation for doing the original crime. The converse is true that concentrated criminality exposes non-criminals in a family, social network, and/or community, providing them an atmosphere tolerable to criminal behavior.

Hate crime and mass killings are intended to victimize more than the targeted individual; they are intended to harm others who may be like the victims. With mass killings, this victimization is often aimed broadly at the unaccepting public (Canter and Youngs, 2016). In hate crimes this means others who share the same socio-cultural background as the victim. Nationally, shootings such as the 2016 Pulse nightclub attack on an Orlando, Florida, (Zambelich and Hurt, 2016); or the 2018 Synagogue

Figure 4.10-16: North Dakota Neo-Nazis at a Rally, 2013

Source: Revolution News/Twitter

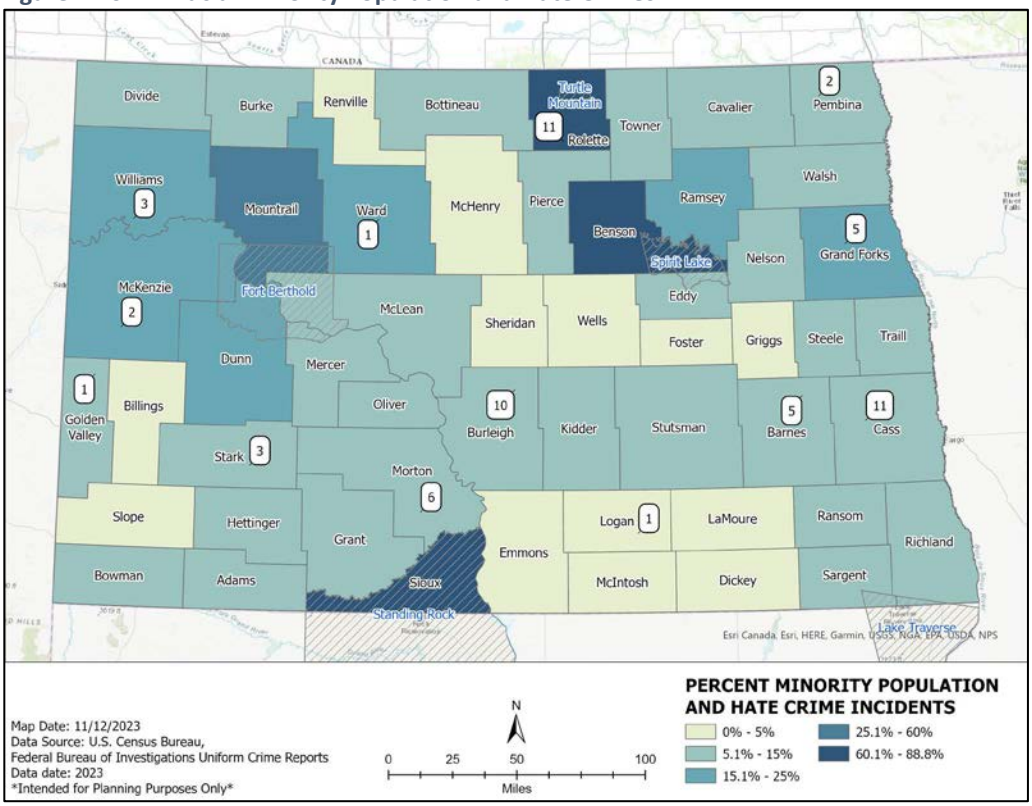
attack near Pittsburgh (Rosenblatt, Winter and Dienst, 2018), are examples of racial-, social-, or ethnic-based terrorist attacks where facilities were selected because they were gathering places for the targeted victim group.

While attacks like these have not occurred within the state of North Dakota, a potential attack could emulate these targets and tactics. Groups singled out for victimization are almost always socially vulnerable groups, such as racial, ethnic, social, or religious minorities. Victims often have fewer resources or access to power structures and decision-making to affect the outcome and recovery from such an event. Three sets of incidents in Fargo in 2022 impacted the victimized businesses, bringing light to aspects of vulnerability to an attack. After the 2022 incidents Fowzia Adde, whose organization owned the building where many of the properties were vandalized, was quick to point out the loss of business after the events to the Fargo Forum, saying about the customers: “They’re scared now because of the graffiti (Hagen and Morris, 2022). They think they may come back and blow something up.”

Animal rights and environmental extremists often target the agriculture and energy industry, which is prevalent in the state and poses another aspect of vulnerability. The remote location of infrastructure that serves these industries, including pipelines, and feedlots, can make this industry particularly vulnerable to attacks occurring where response is far away.

Figure 4.10-17 shows the percentage of the population that is a racial minority by county along with the number of hate crimes experienced since 2018 in the county. The most hate crimes – anti-indigenous crimes – occurred in Rolette County, where the Turtle Mountain Reservation is located.

Figure 4.10-17: Racial Minority Population and Hate Crimes



Source: BJS-UCR, 2023; U.S. Census Bureau, 2023

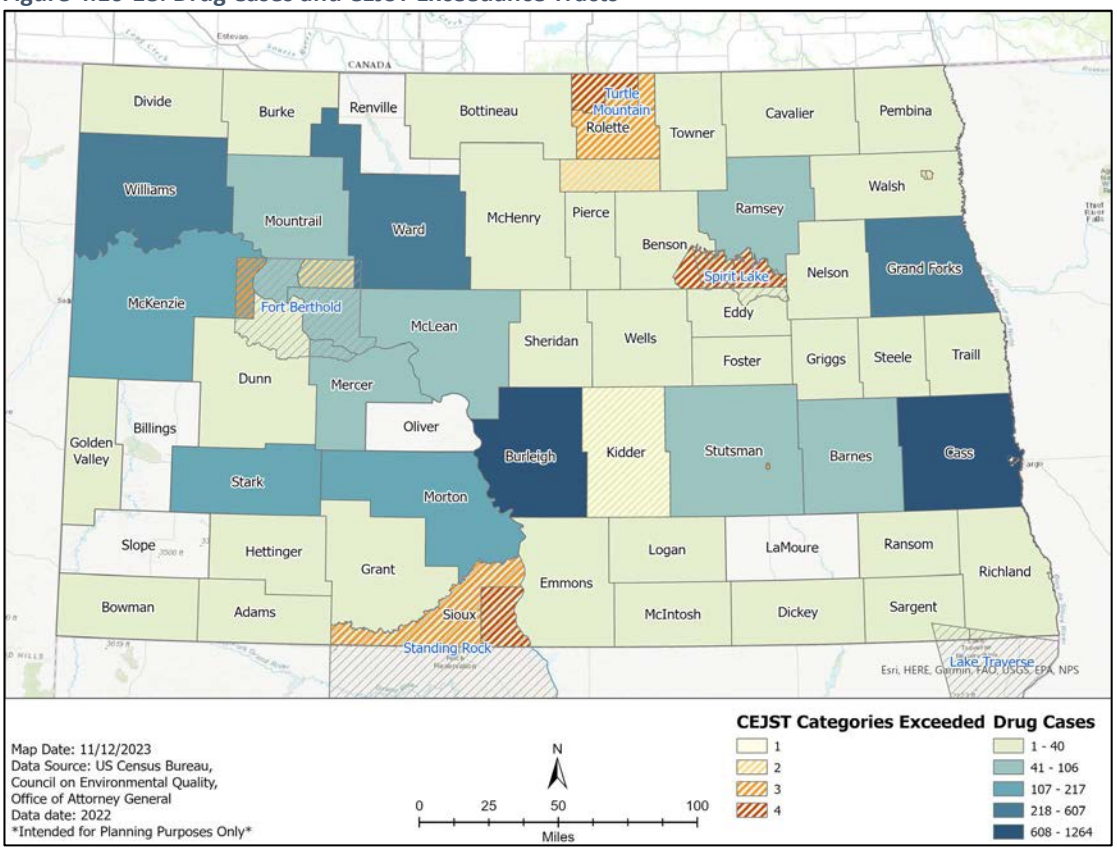
Society cannot just shape criminals and produce criminality as a result, but it can shape how crime investigation is prioritized. For this reason, minority victims of crimes often express feeling doubly victimized – first by the perpetrator, then by a system that prioritizes other victims or minimizes their experiences.

Despite the origin being personal, systematic, or social, the resulting experience is the same for the victim and their loved ones. Additionally, human socio-emotional responses to violent crime are stronger and more negative among single women and those with a low income, due to the stress they already experience in their lives.

Figure 4.10-18 displays the Climate and Economic Justice Screening Tool (CEJST) exceedance Census tracts (Council on Environmental Quality, 2023) where such vulnerability would be expected along with drug cases by county (ND Office of the Attorney General, 2023). Areas in Cass and Sioux counties demonstrate overlaps showing that vulnerable communities in these areas are faced with drug crimes nearby and the externalities associated with such crimes.

Young people who get involved in gangs have a higher rate of criminality than those out of gangs, and this pattern holds true into adulthood regardless of whether the youth remain in a gang or not (Howell, 2006). Gangs can dominate public housing residents who have little opportunity to move to a safer residence. These residents are more likely to be victimized and more likely to avoid areas or adopt

Figure 4.10-18: Drug Cases and CEJST Exceedance Tracts

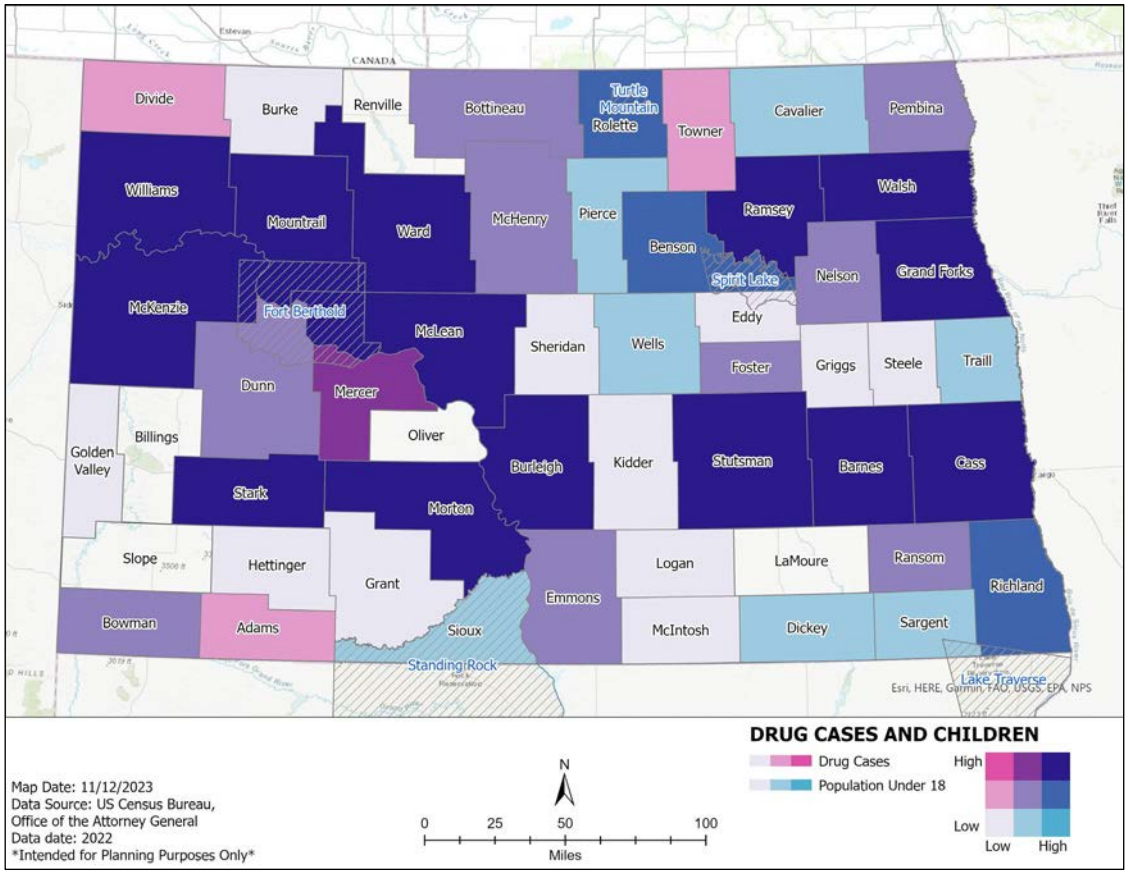


Source: CEQ, 2023; BJS-UCR, 2023

alternate routes that make chores more difficult in the pursuit of a safer route that avoids gangs. Gang members may charge money to residents to avoid victimization or may expect free labor or criminal favors from residents (Venkatesh, 1996). They also can influence young people to recruit them to the organization.

Figure 4.10-19 shows the locations of drug cases and areas with more or fewer children. Many of North Dakota's rural areas have low numbers of both. The northwest portion of the state and I-94 corridors are often where there are high rates of drug crimes. These areas also have a large number of children.

Figure 4.10-19: Drug Cases and Children



Source: BJS-UCR, 2023; ACS, 2023

Native Americans are disproportionately victimized by human trafficking with nearly 75% of cases categorized as Native American according to the Attorney General's Human Trafficking Commission (ND Attorney General Human Trafficking report, 2020) This report also concludes that human trafficking cases are twice as likely to happen in urban environments than in rural and the two most impacted age groups includes ages 18-29 and 40-49. In 2020, the North Dakota Human Trafficking Task Force (NDHTTF) served 99 victims of human trafficking, five arrests were made, 57% of victims were adults and 43% were minors. Cases were throughout the state with the northeast corner having slightly more.

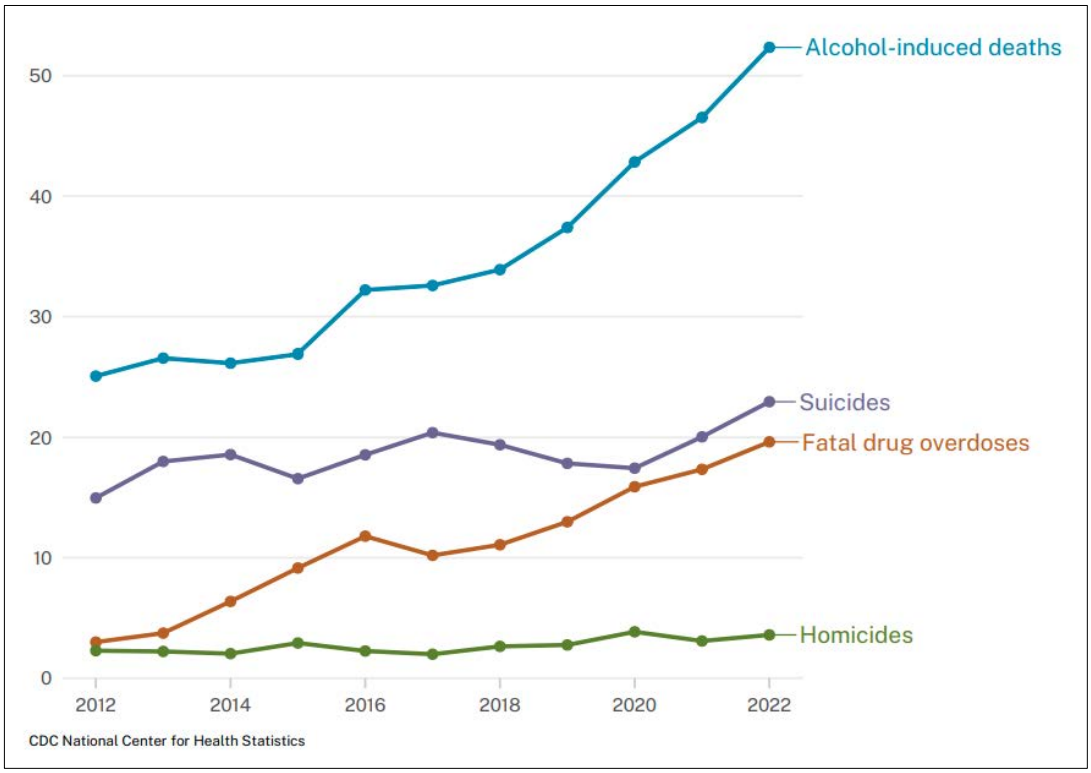
The perpetrators of this violence in 88 percent of the cases are non-native. Human trafficking often goes underreported because the exploitation often is not recognized as it rarely takes on the appearance as a chained, kidnapped victim in a basement. Instead, it is a transaction brokered by another party, which

may even be a relative (Wulfhorst, 2016) This inability to identify exploitation is not just a feature of society at large, but law enforcement officers as well. On Native American Reservations, the complex jurisdiction issues and distrust of the federal government contribute to a substantial under or non-reporting.

Hate crimes, whether violent or in the form of property damage, are acts of harm intended to injure a vulnerable population. Prejudice and discrimination are the purpose of the criminal act (Novotney, 2023). They can cause depression, anxiety, post-traumatic stress disorder, suicidal thoughts, and physical ailments. These ailments may be felt not just by direct victims, but others who share a similar background as the victim.

Figure 4.10-20 measures annual death rates per 100,000 citizens in North Dakota. Though overall crime rates appear to be increasing, violent crime that results in death, as measured in homicides, has not shown a significant increase over the past 10 years. However, the rate of alcohol, suicide, or drug-related deaths, the Deaths of Despair as discussed earlier in this sub-section, have increased substantially.

Figure 4.10-20: Trend in Deaths of Despair in ND as compared to Homicide, 2012-2022.



Source: Justice Center, 2023

In 2022, there were 408 deaths that were alcohol-induced, 179 people died by suicide, 153 people died from overdose, and 28 people were victims of homicide (Justice Council, 2023). These rates have all increased over the last five years.

4.10.2.2 First Responders

When a crime occurs, first responders are typically called to the scene to bring order and possibly make arrests. As part of their professional duty, law enforcement officers confront disorderly individuals and may face death, injury and trauma when performing their duties.

Figure 4.10-21: Officers salute deceased Officer Jake Wallin, July 2023

Source: Fargo Police Department. Reprinted with Permission.

As the first on the scene when 9-1-1 is called, first responders often face criminals when they are still agitated from the crime, or even during or before the crime is committed. With limited information about what they will face upon arrival, it can place first responders in a vulnerable position. This cost Fargo law enforcement officer Jake Wallin his life in July 2023, when officers responding to a vehicular crash were met with an ambush attack (Mayorquin, 2023). While police officers face the most constant threat, firefighters responding to a fire do not immediately know if there are accelerants, and paramedics often treat and transfer injured criminals shortly after their criminal activity.

4.10.2.3 Environmental, Natural, and Cultural Resources

Most criminal attacks have limited consequence to the environment.

Cultural resources and religious organizations that are sites for gathering or celebrating a targeted group for a hate crime may have a higher vulnerability than other natural and cultural resources. Past hate crimes have vandalized synagogues in the state (ADL, 2023). Non-religious cultural resources also can be the site of hate crimes.

Figure 4.10-22: North Dakota's Capitol Grounds

Source: Taborsky, North Dakota Tourism, 2019

4.10.2.4 Property, Facilities, and Infrastructure Damage

Due to the nature and size of the venues, public gathering places such as State Fair Grounds, parks, and public squares can be appealing sites for mass shootings due to the accessibility of victims, and damage to these facilities or their reputation can have consequences to business operations (Mayorquin, 2023).

While not a state facility, local public housing developments can be prone to gang takeovers that greatly impact the housing authority's ability to maintain the property while simultaneously impacting the safety of residents.

There are some properties that are more vulnerable than others. Property near areas where people gather to protest, in areas with heavy gang presence and/or property that belong to a person from or that caters to a targeted group of a hate crime may be more vulnerable to physical and reputational damage associated with crime. These properties are likely to be found in more urban compared to rural areas.

4.10.2.5 Critical Facilities, Community Lifelines, and State Assets

The consequences to facilities, lifelines, and state assets are the same as private property and facilities. Physical damage and reputational damage are the consequences of crimes occurring in these areas. A mass casualty event in the form of a criminal attack may overwhelm local hospitals or paramedics.

An increase in crime can lead to the need for new facilities to house criminals (Howell, 2006). The North Dakota Department of Corrections plans to build a new $161 million women's correctional facility. The funding comes from the state's rainy-day fund (Huebner, 2023). Similarly, crime, fear of mass shootings, and/or a gang presence in schools often prompt districts to add security guards and/or security features, which costs money as well.

Rural areas can be more easily impacted by a criminal attack. There are limited responders and hospital services in rural areas, and the response capability can be more easily impacted with delays and the need to seek mutual aid partners to assist.

4.10.2.6 State Economy and Economic Disruption

The existence of the insurance industry, correctional facilities, and law enforcement demonstrates the role crime has in the economy. In these instances, the very existence of these industries is driven by the existence of crime. Crime also has an impact on the cost of these services. (Canter and Youngs, 2016). Insurance premiums, law enforcement costs, and the need for new correctional facilities are driven by the amount of crime in the community.

Local economies can see their revenues impacted by an increase or perceived increase in crime. Rural communities can be particularly vulnerable to this impact because they rely on a small number of properties and people for revenue. According to Ellen and Lacoe (2015), an increase in violent crime has been linked to an increase in foreclosures, meaning that violent crime can harm neighborhoods more drastically than vandalism and theft.

4.10.2.7 Delivery of Service and Continuity of Operations

Howell (2006) found that as city size grew, so did the number of city departments which reported issues with gangs. Crime can impact the delivery of services in many ways. Vandalism, security for events, and security for service providers all can be impacted by an increase or perceived increase in crime (Howell, 2006). The protocols, costs, technology, and resources that are needed by law enforcement activities can be impacted by the presence of gangs (KFGO, 2019). The states of North Dakota and Minnesota share regional gang affiliation information in the area.

Operations in areas with high crime rates or heavy gang activity may be disrupted or need to be adapted to cope with fear of victimization.

A criminal attack may be launched for the purpose of impacting government operations. Although that has yet to occur in the state of North Dakota, such events have occurred at the national level on January 6, 2021, when criminal attacks were launched to disrupt the counting of electoral votes for president. In Michigan, on April 30, 2020, armed civilians rushed the Capitol demanding to be let into the Legislature floor, crowding public spaces above the floor, and chanting while holding weapons. In such attacks, government operations that require in-person presence, such as legislative votes may be particularly vulnerable.

4.10.2.8 Public Confidence in the State's Governance

Perceived grievances with law enforcement and the local and state support of law enforcement have been an increasingly volatile issue in the United States since the last plan update. Throughout the spring of 2020, both peaceful protests and civil disturbances occurred nationally in response to the erroneous law enforcement killing of Breonna Taylor in Louisville, Kentucky, during a no-knock warrant enforcement (Pew Research Center, 2022). The subsequent death of Minneapolis resident George Floyd, while police were taking him into custody, set off another round of events extending into the summer and fall seasons and leading up to the 2020 presidential elections. Protests occurred around the country, especially in Minneapolis and St. Paul Minnesota, but also spread to other Northern Plains urban areas such as Fargo. Trust in police is highest among white Americans 60 and older who identify as Republican or Republican-leaning, and substantially lower among minorities and young people. Nearly two-thirds of black men in America said they had been unfairly stopped by police, compared to 9 percent of white Americans (Pew Research Center, 2023). Previous interactions with law enforcement or media may impact the confidence in law enforcement and other government functions relating to civil disturbance. Civil disturbance may result in increased criminal attacks or other community impact.

4.10.2.9 Estimation of Annual Losses

The cost of crime nationally in 2021 was estimated to be $2.86 to $3.92 trillion. This estimate includes the cost of protective equipment such as alarm systems and security cameras, opportunity cost lost to incarceration or victimization, the risk to life and health and the transfer of assets via burglary or other crimes (Anderson, 2021). This methodology builds upon previous methods of valuing crime by adding in the cost incurred to the victim due to lost productivity and transfers of items from the victim to the criminal. On a national basis, that would make the total cost of crime around $10,000 per U.S. resident in 2021.

Using Anderson's (2021) methodology, one can consider only the costs directly incurred by society as a whole, versus the individual victims, as shown in **Figure 4.10-23**. Here the total annual estimated costs for crime prevention, protection, and legal or medical recovery come in just under $1 trillion for the entire country, in 2021. This would amount to around $2,988 per resident. The cost for law enforcement (police protection and investigative services) alone would amount to around $470 per U.S. resident.

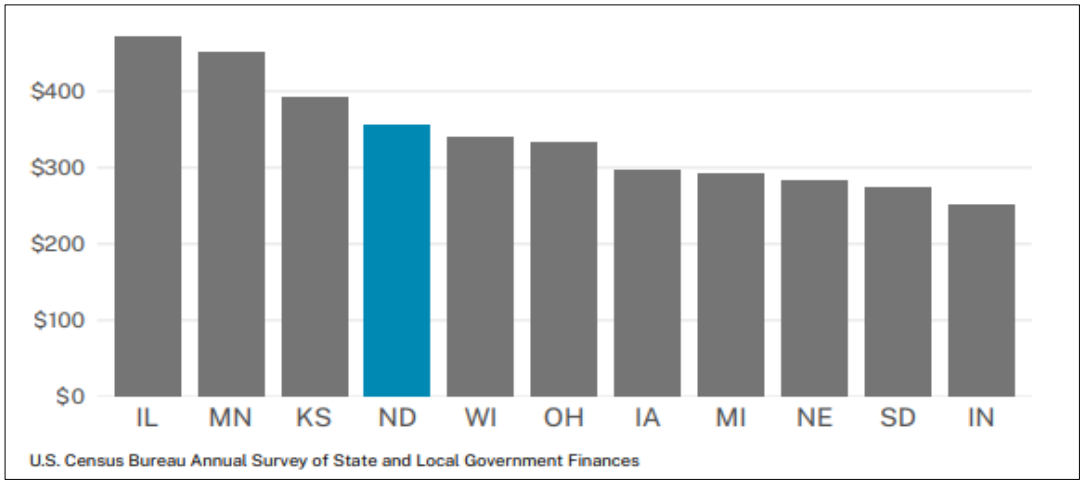
Figure 4.10-23: Crime Production Costs in the United States

Product or Service	Cost ($Millions)
Police protection	153,009
Drug trafficking	151,256
Malicious cyber activity	116,649
Medical care for victims	110,339
Corrections	95,045
Federal agencies	74,931
Security systems	54,856
State and local judicial and legal services	51,891
Prenatal exposure to cocaine and heroin	38,663
Security guards and patrol services	30,629
Punishment cost to family and community	30,075
Federal drug control programs	21,883
Safety lighting	14,089
Small arms and small arms ammunition	10,741
Locks, safes, vaults, and locksmiths	10,528
Driving under the influence costs to driver	9,186
Recovery from vandalism or graffiti	6,721
Protective fences	3,529
Investigation services	3,138
Armored-car services	2,542
Replacements due to arson and other crimes	1,239
Cybercrime and identity theft insurance	1,219
Mothers against Drunk Driving	38
Nonlethal personal defense products	17
Total	992,213

Source: Anderson, 2021

By comparison, In 2021, state and local governments in North Dakota actually spent around $275,627,000 on law enforcement services. This was about 2.3 percent of total state and local expenditures that year, and about $354 per resident (Justice Center, 2023). **Figure 4.10-24** shows how North Dakota expenditures for law enforcement ranks among various states within the Midwestern region.

Figure 4.10-24: Law Enforcement Expenditures in the Midwestern Region, 2021



Source: Justice Center, 2023

4.10.2.10 Community Resilience

The prevalence of surveillance equipment and the ability to share footage easily with law enforcement has been crucial to improving community resilience to crime. More than just improving information shared with police, law enforcement initiatives in the state seek to be proactive in their interface with resident technology. For example, the Dickinson Police Department's Surveillance Camera Registration and Mapping Program (SCRAM) encourages residents to register their local surveillance cameras with law enforcement (Jahftson, 2020). This allows for law enforcement personnel to out to the resident when it's believed that their footage may be useful in documenting a crime or observing perpetrators.

The City of Fargo uses another model for community policing efforts that trains officers to deal with people experiencing mental crises or trauma and improves relations between the police and social service providers (Fargo Police Department, 2023). The Fargo Police Department also creates Community Engagement Teams that interact with the public, including downtown residents and businesses, transient camps, immigrant communities, and the LGBTQ2S community.

Figure 4.10-25: Jurisdiction on Reservations

Source: U.S. Department of Justice, 2020

The complex and overlapping jurisdictions existing in tribal communities are a challenge to community resilience that criminals often exploit. There are three layers of law enforcement on reservations – state, federal, and tribal.. It can create issues around which agency takes the lead in an investigation. This can depend on if the victim or suspect are tribal citizens and the level of severity of a crime. If the suspect's identity is not known, and thus their tribal status is unknown, it can create issues around which agency can investigate the crime (Cooper, 2020). Each tribe makes its own decision about the allocation of resources to law enforcement, which can mean that each tribal area has differing levels of capacity to respond to crime.

Boomtown rapid development like that in Western North Dakota can change the way policing occurs, reducing community resilience. Rural communities engage in community policing by default because the police in the community interact with residents outside of law enforcement in their small communities (Archbold, Dahle, and Jordan, 2014). The sudden influx of workers, who are strangers, creates a new approach to policing, re-orienting law enforcement from a community approach to a more professional

or urban approach, and creating increases in workloads on officers that can lead to less interactive approaches to professional and personal life in the community.

4.10.2.11 Future Conditions

This section evaluates how changes in existing conditions may impact criminal attacks and the consequences that they cause.

Through the end of this century in North Dakota, future climate conditions are not expected to directly impact the occurrence of criminal attacks, though indirectly the Extent, Intensity, and Frequency of criminal attacks could potentially be increased. The following list is based on information extracted from the NOAA National Centers for Environmental Information, summary for North Dakota (Frankson, 2022), the Fifth National Climate Assessment (Knapp, 2023), and related resources:

- **Location.** Criminal attacks caused by climate change are not expected, but they could be targeted towards areas of increased social unrest influenced by weather or climate stress.
- **Extent/Intensity.** The extent and intensity of criminal attacks may increase as criminal target areas where social unrest linked to anxiety regarding climate variability and change has increased, though climate change itself is not expected to directly impact the extent/intensity of criminal attacks.
- **Frequency.** Criminals may target attacks against areas or people suffering increased social unrest influenced by weather or climate stress.
- **Duration.** The duration of criminal attacks is not projected to change because of climate change.

FEMA defines an attack is a hostile action taken against the United States by foreign forces or terrorists, resulting in the destruction of or damage to military targets, injury or death to the civilian population, or damage or destruction to public and private property (FEMA: Attack, 2023). A Criminal Attack would then be a hostile action taken against a person or property leading to that person's injury or death, or damage or destruction to public or private property, in such a way that a public law was broken.

4.10.2.11.1 Extreme Climate Variability and Climate Change

Through the end of this century North Dakota's natural yet extreme climate variability will continue to be the primary influencer or signal within each natural hazard (Frankson, 2022). This may directly or indirectly impact areas and peoples across the state over days to decades long timescales, while the much more subtle and gradual trends of climate change over the rest of this century act to extend the range of such variability (Knapp, 2023). And such studies show, both trend and variability could extend beyond that which has previously been documented in the historical record.

> High-speed pursuits and domestic assaults are the most commonplace type of crime occurring in Grant County. The county also has a higher-than-average frequency of sexual criminal activity against children compared to other counties in the state.
>
> *(Grant County Multi-Jurisdiction Hazard Mitigation Plan, 2022)*

Recent climate change trends have shown, and future projections suggest that the state can expect continued gradual warming in all seasons, with greatest warming in the winter season. Overall precipitation is likely to increase, but with a high degree of inter-seasonal and interannual variability, which could lead to longer and stronger droughts interspersed with more frequent and more intense flooding (Swain, 2015). Severe summer and winter season storms will continue to occur in both drier, drought-prone periods, and wetter, flood-prone periods within the state's overall extreme climate variability.

Like civil disturbance, most crime results from societal reasons such as economic hardship, social injustices, ethnic differences with long-standing oppression by a group of people towards another, objections to world organizations or certain governments, political grievances, and terrorist acts (USAR, 2005). Future climate projections through the end of the century indicate the potential for increased societal insecurities and instabilities (Hoegh-Guldberg, 2018) including places like the Northern Great Plains region as exemplified by recent Dakota Access Pipeline (DAPL) civil unrest (Powys-White, 2016; Levin, 2016; EELP, 2023). In most such cases, climate conditions are not the direct cause of the unrest but may exacerbate underlying instabilities.

4.10.2.11.1.1 Impact

Within the state, and across the Northern Great Plains (NGP) in general, the direct physical or ecological impacts from our extreme climate variability, current climate trend, or climate change projections are not expected to have a corresponding primary or direct cause/effect relationship to Criminal Attack, much like Civil Disturbance, based on global analyses (Benjaminsen, 2016). There may be secondary or indirect effects apparent in certain regions like the Middle East and North Africa, where climate change may trigger, accelerate, or deepen existing civil or personal instabilities (Sofuoğlu & Ay, 2020). It is speculated that such an effect could eventually be felt in North Dakota as well.

Climate change in the post-industrial era, to-date, is suspected of having affected food production and exacerbated food insecurity in certain developing countries of Sub-Saharan Africa (Aribigbola, 2013; Evans, 2021). However, physical science studies of these same areas have found that interannual or multi-decadal climate variability, as opposed to long-term climate change, is more likely the underlying cause of recent drought and flood episodes (Paeth, 2011; Taylor, 2017), similar to what has been found for the Northern Great Plains region (Hoell, 2019; Hoell, 2023). As was discussed in Section 3, such short-term climate variability quite often leads to substantial impacts while background climate trends can seem harmless.

4.10.2.11.1.2 Adaptation

There are no expected direct impacts expected by climate change on criminal activities in the NGP region, so there are no specific adaptation actions other than those already suggested as part of other hazards.

4.10.2.11.1.3 Mitigation

There are no expected direct impacts expected by climate change on criminal activities in the NGP region, so there are no specific mitigation actions other than those already suggested as part of other hazards.

4.10.2.11.2 Other Changes

As discussed in Section 3, the cascading ecological effects of climate change could result in less ability for families to provide for themselves, increasing refugee and migration flows, and acting as a catalyst for the increased spread of diseases (Causevic, 2017). Researchers have also found that increased geopolitical risk and corruption, whether enhanced by climate change or not, can in turn lead to increased greenhouse gas emissions in those affected regions (Anser, 2021), that may lead to a feedback loop for further global instability unless policies are enacted to reduce the growth of shadow economies and their effects on geopolitical uncertainty (Chu et al., 2023). From a security standpoint, climate change may be a threat capable of multiplying and aggravating already existing problems (water shortages, droughts, etc.) as well as generating fertile ground for future personal and nation-state security threats.

> One murder occurred in the City of New Rockford as an active shooter targeted a wedding dance at the Eagle's Club in 2015.
>
> *(Eddy and Wells Counties Multi-Jurisdictional Hazard Mitigation Plan, 2023)*

Recently, the legislature passed a law prohibiting municipalities from adopting laws that are stricter than state law as it relates to gun control. Fargo officials appear most upset about provisions that allow gun sales from residences (Burgum, 2021; Dura, 2023). Thus, the city of Fargo has filed a second lawsuit against the state, active at the time of the Plan update, claiming the legislature is violating their Home Rule Charter.

The urban areas of the state are anticipated to have a 24.6 percent growth rate between 2020 and 2040 (U.S. Census Bureau, 2020). Areas in and near Fargo, Grand Forks, Bismarck, and Williston will see more infill development and development on their fringe and nearby smaller communities, increasing the amount of people available to congregate for criminal attacks.

The recent oil boom in the Bakken fueled an increase in human trafficking. Non-locals could blend in more easily, there was an influx of oil money, and a mostly male workforce that contributed to problems. Gangs and drugs also moved in quickly at the time, and these issues have persisted. (Horwitz, 2014). Increased migration, the decrease in people hiding their sexuality from the wider public, and an increase in extremism are all factors that may lead to an increase in hate crimes, discussed more in depth in section 4.14.

As discussed in section 4.10.2.2.10, dramatic increases in population can impact how policing is conducted and reduce community resilience to crime. The alternative is true as well. Dramatic decreases in population, such as is happening in North Dakota's most rural counties can increase crime while simultaneously limiting resources available to fight crime.

Methamphetamines are a drug that is inexpensive, easily available, and capable of being produced by users. Its impacts have been particularly hard felt in rural areas. Externalities of use include child abandonment, theft, prostitution, violent crime, and hepatitis A. Meth seizures in the Drug Enforcement Agency division that includes North Dakota increased 31 percent in 2019. The state's attorney general linked the drug to increases in aggravated assaults, burglaries, and thefts. Homicides in rural communities increased 25 percent in 2020, the largest increase since 1999; meth use, alcohol and pandemic isolation were noted as factors (Morris, 2018; KXNews, 2019; Frosch, Maher, and Elinson, 2022). As discussed in section 4.10.2.2.10, dramatic increases in population can impact how policing is

conducted and reduce community resilience to crime. The alternative is true as well. Dramatic decreases in population, such as is happening in North Dakota's most rural counties can increase crime while simultaneously limiting resources available to fight crime.

4.10.3 Risk Analysis

Risk can be defined as the potential for loss of or damage to an asset (FEMA EMI, 2023). This section analyzes the potential for loss or damage in the state of North Dakota.

4.10.3.1 National Risk Index

The National Risk Index does not evaluate this hazard.

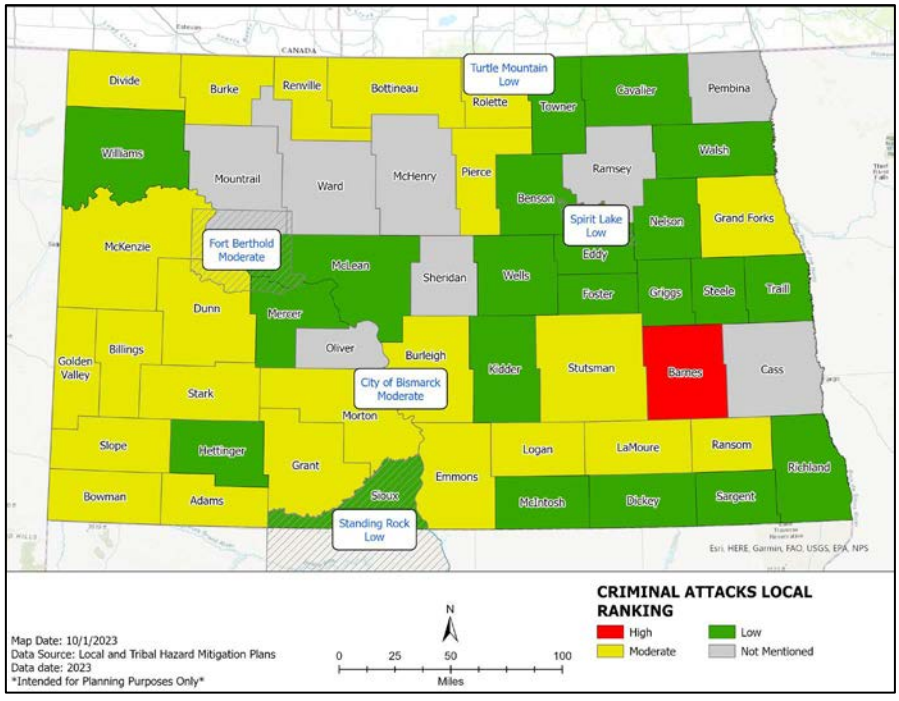
4.10.3.2 Risk Index Score

The Priority Risk Index for this plan update ranks criminal attacks as a moderate risk with a score of 2.2. Criminal attack is tied with space weather and hazardous material release for 9th of 15 hazards.

4.10.3.3 Jurisdictions at Risk

Criminal Attack is a newly identified individual hazard identified by the state. It was previously grouped with terrorism and nation-state attacks. **Figure 4.10-26** shows the map for the combined hazard as mentioned in local and tribal plans. When evaluating local and tribal mitigation plans, 50 of 58 jurisdictions with adopted plans identify such attacks as a hazard impacting their jurisdiction. Of all plans that ranked hazards, 24 considered it a low risk. Only Barnes County considered it to be a high risk.

Figure 4.10-26: Adversarial Attacks in Local/Tribal Hazard Mitigation Plans



Source: Local and Tribal HMPs, 2023

4.10.4 Summary/Conclusion

The following bullets summarize highlights and conclusions related to criminal attacks.

- North Dakota has had relatively few mass shootings, but a July 2023 police shooting likely thwarted a larger mass-killing event.
- North Dakota law enforcement officers work toward intra-agency collaboration such as joining the join Minnesota law enforcement officers with sharing of criminal justice information (I.e., gang associations and activities).
- Native American women are dramatically more likely to be victimized by crime or to be victim of human trafficking.
- Jurisdictional complexity is a factor in crimes occurring on reservations including human trafficking.
- The oil boom brought with it an increase in gang activity, human and drug trafficking.
- Historically speaking, North Dakota has had a minimal history with mass shootings.

4.10.5 Data Limitations

Crime statistics can only demonstrate the risk of reported crime, and much crime goes unreported. Much of the data that could give the clearest picture of probable risk and consequences of a future criminal attack would be sensitive in nature. The state has been identified as an under-reporter of hate crimes as well.

4.11 Hazardous Material Release

This section will provide an overview of the threat, previous occurrences, likelihood, location and extent, probability, consequences, future conditions, and mitigation strategies to combat hazardous materials releases in North Dakota.

4.11.1 Overview

4.11.1.1 Description

The U.S. Department of Homeland Security defines a hazardous materials release as the "improper leak, discharge, or disposal of hazardous materials or substances which poses a significant threat to human health, safety, property, and the surrounding environment" (DHS, 2023). The potential hazards of these materials vary greatly.

Several state and federal agencies are responsible for regulating clean-up of hazardous materials (HazMat) releases. Private industry partners are also key players when responding to HazMat releases, highlighting the need for private-public partnership. HazMat is associated with many industries throughout North Dakota including oil and gas development, agriculture, manufacturing industries and more.

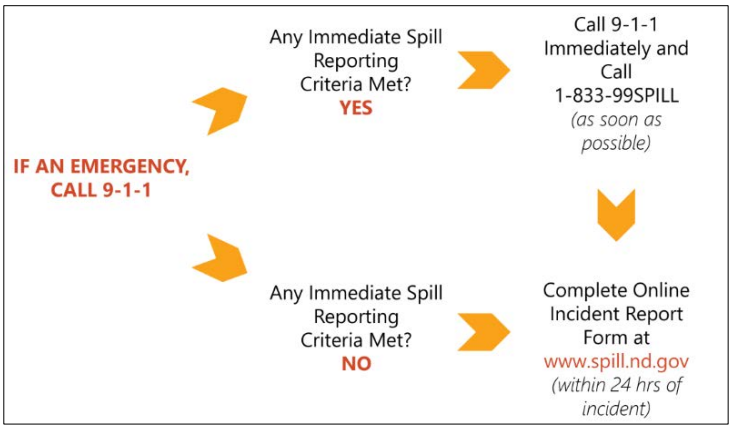
Prioritizing Vulnerability

North Dakota utilizes the Environmental Protection Agency's EJScreen Tool. The tool combines knowledge and data about demographics and environmental risk to better identify where there might be vulnerable populations in areas of environmental risk. Information is updated regularly to provide the best available data, but it does not contain facts for all environmental risk. It is aggregated to the Census Block Group, which can be a large area in rural communities, and thus shows where vulnerable populations may be, although they may be outside of the impacted area. This tool can be especially useful for communities with known hazardous materials that could cause damage in future incidents. Particular addresses can be input with a defined perimeter to help identify the evacuation and shelter needs and level of assistance that may be needed to assist vulnerable communities in the event of an incident (EPA, 2023).

Since 1988, the Hazardous Chemicals Preparedness and Response Program at NDDES has monitored all hazardous materials stored in the state through annual reporting requirements. Since January 28, 2021, HazMat incidents are reported to the program through the Unified Spill Reporting System – HazConnect, via https://www.spill.nd.gov/ or by calling 1-833-99SPILL (1-833-997-7455).

Figure 4.10-1 shows the decision and reporting process that a responsible party should consider when an incident occurs. There are specific criteria that would trigger the need for an immediate report (NDIT, 2023).

Figure 4.10-1: HazMat Spill Decision Process



Source: NDIT, Unified Spill Reporting System, 2023

Until January 28, 2021, the state of North Dakota tracked hazmat spills via WebEOC. After that date, HazConnect became the method for tracking data, which allowed for more ease of monitoring across agencies and standardized reporting for responsible parties.

The specific criteria that would trigger the need for an immediate report are:

- Incident with a potential impact to public health
- Potential impact to waterways
- Injury or fatality
- Potential need for evacuation
- Immediate impact on wildlife.

The State of North Dakota requires both Tier I and Tier II chemical reporting. North Dakota Century Code, Section 312 includes a two-tier approach. Tier I requires information (such as maximum amount of hazardous chemicals at the facility during the preceding year, an estimate of the average daily amount of hazardous chemicals at the facility, and the general location) be aggregated and reported by hazard categories. Tier II requires the information mentioned above, but also requests information on specific location and storage (NDDES Hazardous Chemical, 2023). Tier I and Tier II reports are associated with storage of hazardous materials. Official spill reports under these requirements include federal law and other state agency administrative codes.

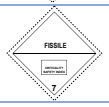
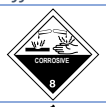
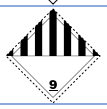
The multi-agency approach provides an opportunity for close collaboration to ensure all requirements and information is reported. Driven by the ND Century Code, Tier II reports are more specific. This is a common approach among most states as Tier I is more generalized, which simplifies reporting and administrative costs.

In accordance with 49 CFR § 172.400 - General labeling requirements, hazardous materials must be labeled in a uniform manner. **Figure 4.11-2** shows the various categories of hazardous materials by hazard class or division, their required label names, and required label designs. Regulated materials include a variety of flammable substances and explosives, poisons, radioactive and corrosive materials (EPA, 2023). For the purpose of transportation, the Federal Motor Carrier Safety Administration also identifies a Dangerous ninth category for miscellaneous, unhealthy materials that do not fit under EPA guidelines with a black and white striped placard (FMCSA, 2018). These labels provide context for first responders, hazardous materials operators, and other citizens that may be impacted by a spill.

Figure 4.11-2: Hazardous Material Labels

Hazard Class or Division	Label Name	Label Design
1.1	Explosives 1.1	
1.2	Explosives 1.2	
1.3	Explosives 1.3	

Hazard Class or Division	Label Name	Label Design
1.4	Explosives 1.4	
1.5	Explosives 1.5	
1.6	Explosives 1.6	
2.1	Flammable Gas	
2.2	Non-Flammable Gas	
2.3	Poison Gas	
3 Flammable Liquid (Combustible liquid)	Flammable Liquid (none)	
4.1	Flammable Solid	
4.2	Spontaneously Combustible	
4.3	Dangerous When Wet	
5.1	Oxidizer	
5.2	Organic Peroxide	
6.1 (material poisonous by inhalation (see § 171.8 of this subchapter))	Poison Inhalation Hazard	
6.1 (other than a material poisonous by inhalation)	Poison	
6.1 (inhalation hazard, Zone A or B)	Poison Inhalation Hazard	
6.1 (other than inhalation hazard, Zone A or B)	Poison	
6.2	Infectious Substance	

Hazard Class or Division	Label Name	Label Design
7 (see § 172.403)	Radioactive White-I	
7	Radioactive Yellow-II	
7	Radioactive Yellow-III	
7 (fissile radioactive material; see § 172.402)	Fissile	
7 (empty packages, see § 173.428 of this subchapter)	Empty	*Any labels previously applied in conformance with subpart E of part 172 of this subchapter are removed, obliterated, or covered and the "Empty" label prescribed § 172.450 of this subchapter is affixed to the packaging*
8	Corrosive	
9	Class 9	

Source: 49 CFR § 172.400 - General labeling requirements, 2023.

The following sections will review previous occurrences of hazmat incidents in addition to location and extent, followed by consequences and vulnerabilities associated with this hazard.

4.11.1.2 Previous Occurrences

The following section describes notable and recent events of hazardous materials releases in the state of North Dakota.

Figure 4.11-3: Minot Ammonia Derailment

Source: NTSB, 2004

- In January 2002, anhydrous ammonia, common in fertilizer, proved extremely dangerous near Minot. **Figure 4.11-3 s**hows a photo from the Canadian Pacific train derailment which caused five cars carrying the substance to rupture, sending an ammonia cloud across the area. A house was hit by a derailed car and a man found dead nearby. More than 60 entered the emergency room with breathing issues, 17 were admitted and seven were placed in intensive care (Witte, 2002; NTSB, 2004).

- In November 2010, during a Mountrail Williams Electric Cooperative project a crew was digging a trench for buried lines and had not notified the state (North Dakota Mitigation Mission Area Operations Plan Update, 2018). Two dozer operators were injured, and one employee was killed when the dozer struck the natural gas pipeline.
- In February 2012, a methamphetamine lab exploded in a Dickinson apartment, injuring the resident, destroying the apartment unit, and causing the building to be evacuated.
- In March 2019, a Canadian Pacific train derailed east of the city of Carrington around 8 a.m. Approximately 35 cars derailed with some containing anhydrous ammonia and propane. A small amount of anhydrous ammonia was released.
- In December 2019, A gasoline tanker-truck accident near Epping in Williams County caught fire, hospitalizing the driver (NRC, 2023).
- In September 2020, lightning ignited a fire in a saltwater brine tank farm (NRC, 2023). The drilling brine released from 13 tanks in Alexander exceeded secondary containment, spilling 1,215 barrels of the extraction byproduct into McKenzie County while the fire was left to burn out.
- In August 2021, a Burlington Northern and Santa Fe (BNSF) Railway derailment of 20 cars loaded with coal in Bismarck near Hemlock Street resulted in a shutdown of tracks in all directions (NRC, 2023, Monk, 2021).
- September 2022, three contract workers were hospitalized from a Chord Energy oil field explosion near Stanley. The fires from the explosion could be seen in Ross. Both Stanley and New Town Fire Departments responded (NRC, 2023, Carvell, 2022).
- In February 2023, a tank explosion near Alexander engulfed an employee in flames. He put out the fire by jumping in snow, but still required an airlift to Minnesota as 300 barrels of produced water spilled (NRC, 2023; Rodenberg, 2023).
- In Richland County in late March 2023, 31 cars of a 70-car Canadian Pacific train derail, spilling propylene, ethylene glycol and asphalt into private land. Cold weather resulted in minimal damage to occur as the hazardous materials froze which facilitated removal (Schroeer and Hjelmstad, 2023).
- July 23, 2023, a truck trailer leaked C5 natural gas onto the ground north of Williston in Williams County on County Road 5 as the result of a motor vehicle accident on (HazConnect, 2023).

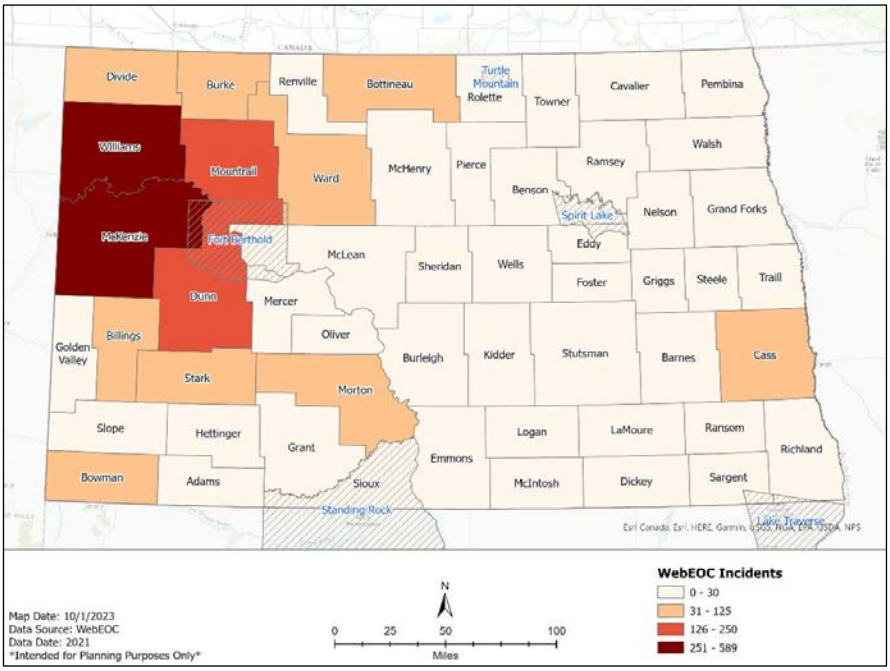
4.11.1.3 Location and Extent

4.11.1.3.1 Incidents

Figure 4.11-4 and **Figure 4.11-5** are maps showing the locations of incidents reported to the State of North Dakota through WebEOC and HazConnect platforms during the Plan update period (2019-2023). These databases are considered the most comprehensive data for HazMat incidents in the state for the time period displayed (HazConnect, 2023).

Figure 4.11-4 shows HazMat 2-year incident data through Dec 31, 2020, in the WebEOC database.

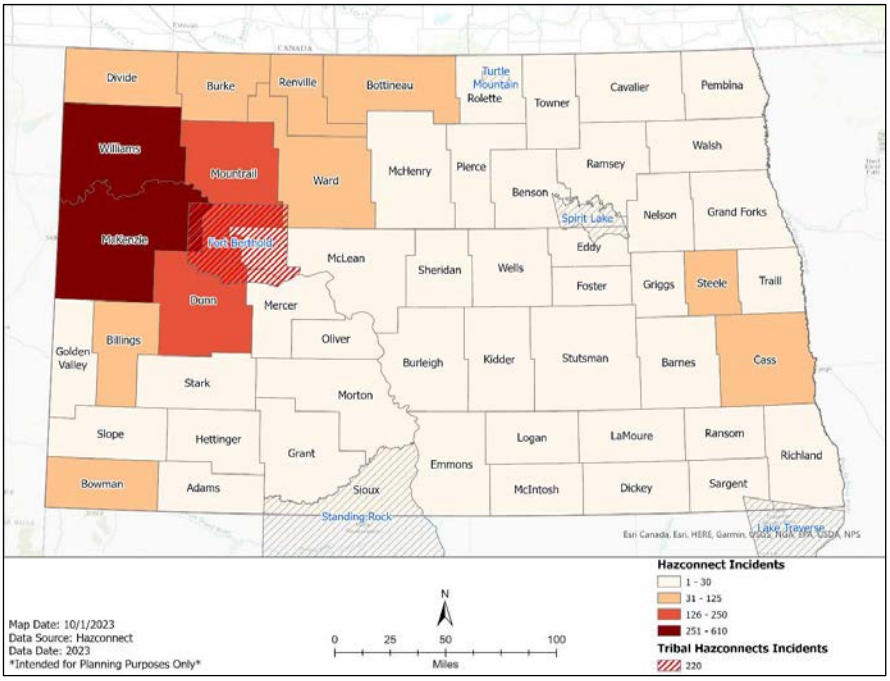
Figure 4.11-4: Location of Incidents Reported to the State Web EOC, 2019-2020



Source: WebEOC, 2021

Figure 4.11-5 shows HazMat 2.6-year incident data through July 30, 2023, in the HazConnect database. McKenzie (589), Williams (377), Dunn (192) and Mountrail (181) each had more than 100 incidents reported to WebEOC in the 2019-2020 period. These four counties represent 59.9 percent of all reports in that period.

Figure 4.11-5: Location of Incidents Reported to the State via HazConnect, 2021-23



Source: HazConnect, 2023

Four counties and a tribal area each had more than 200 incidents from 2021 to 2023. McKenzie (610) led with more than 150 more than Williams (449). Combined, McKenzie and Williams represent 39.0 percent of the 2,713 incidents reported in HazConnect, through 30 July 2023. Dunn (221), Fort Berthold Indian Reservation (220), and Mountrail (207) each had more than 200 incidents. The Bakken region has more HazMat incidents than other areas of the state.

HazConnect also tracks the type of location at which the incident occurred; **Figure 4.11-6** presents a summary of the types of facilities where HazMat incidents occurred. Oil wells were the most common location, with 42.8 percent of incidents occurring at oil wells (HazConnect, 2023). Crude oil and saltwater brine compile a majority of spills in the state.

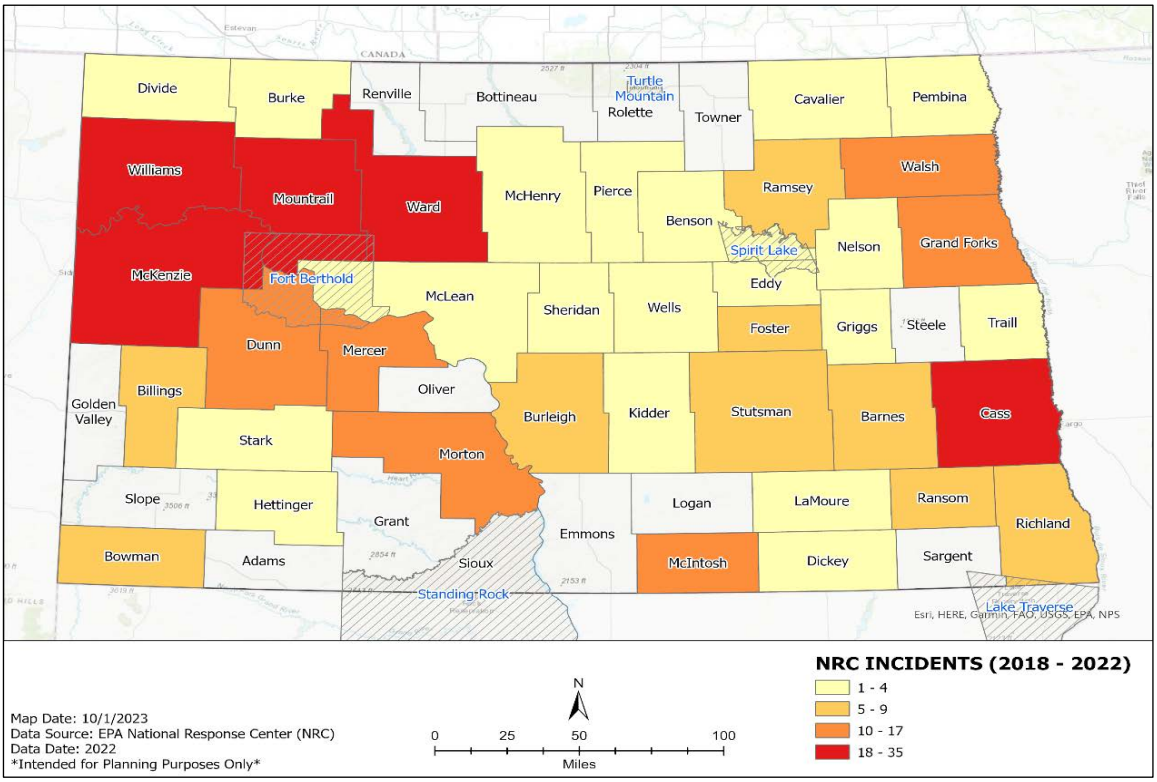
Figure 4.11-6: HazConnect Incidents by Location

Location	Incidents
Well	1,162
Other	562
Fixed Facility	479
Pipeline	223
Transportation	221
Unknown	66

Source: HazConnect, 2023

The longest single database that covers the plan update period is the federal National Response Center (NRC). NRC reporting is required when a hazardous substance (as defined in 40 CFR § 302.4 and found in appendix E.10.2) is released in amounts exceeding the reportable quantity for that substance. HazConnect data and NRC data overlap in 2021 and 2023, but due to North Dakota's broader reporting requirements, the data in the HazConnect system is more comprehensive. **Figure 4.11-7** is a map of NRC incident reports in North Dakota from 2018 to 2022. As it is a subset of all incidents reportable to the state, the totals reported to the NRC are much lower at 326 (NRC, 2023). Williams (35) led 11 counties with more than 10 hazmat incidents. While there are still more incidents in rank higher in this dataset due to the concentration of people and vehicles.

Figure 4.11-7: Location of Incidents Reported to the National Response Center, 2018-2022



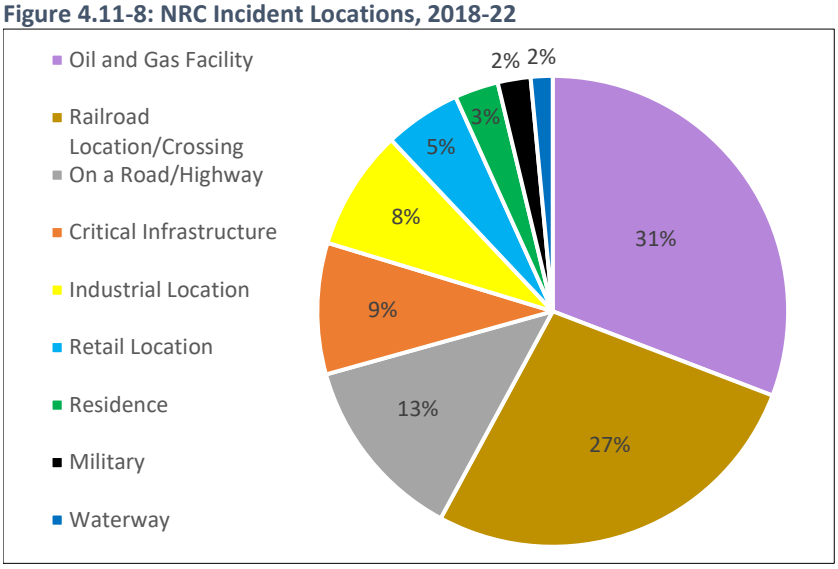
Source: National Response Center, 2023

Figure 4.11-8 shows additional data in the NRC about incident locations. Oil and gas facilities lead the locations for NRC incidents, with 31 percent of all incident reports identifying such a facility (NRC, 2023). More than 40 percent of NRC reports do not list a location or are so general that they cannot be characterized, therefore a complete dataset may alter the order of locations.

A lot of anhydrous operations have closed in Foster County in the last five years due to new federal requirements and the business no longer being cost-effective.

(Foster County Multi-Jurisdictional Hazard Mitigation Plan, 2021)

Figure 4.11-8: NRC Incident Locations, 2018-22



Source: National Response Center, 2023

4.11.1.3.2 HazMat Response Resources

HazMat response resource needs vary depending on the size of the release. A small release may be responded to immediately by on-site personnel with the appropriate equipment, while a large-scale release may require input from city, state, or even federal resources. **Figure 4.11-9** provides an overview of the spatial extent on resources for hazmat releases.

Figure 4.11-9: Spatial Extent for Hazardous Materials Release

Resource	Extent
Public	Statewide
First Responders	Statewide
Delivery of Service and Continuity of Operations	Limited
Property, Facilities, and Infrastructure	Where Pollution and Infrastructure Overlap
Environment	Statewide
State Economy	Limited
Public Confidence in the State's Governance	Limited

June 27, 2018. A spray plane owned by Agrimax crashed into a slough approximately 3.5 miles north of the city of Tappen. The aircraft experienced power loss on takeoff. The crash released pesticide into an area containing native prairie grasses.

(Kidder County Multi-Jurisdictional Hazard Mitigation Plan, 2021)

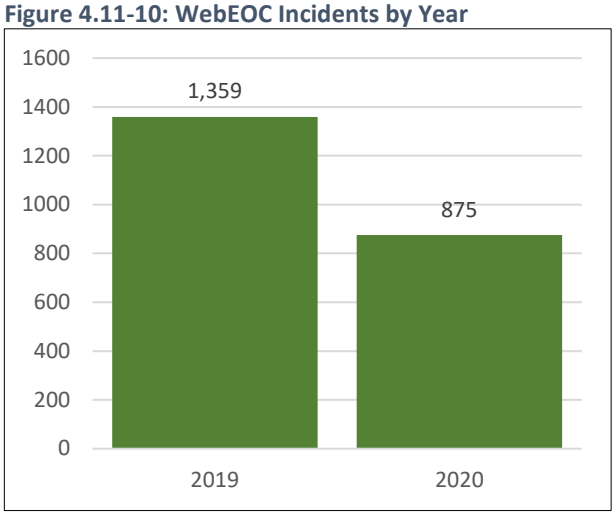
4.11.1.4 Probability

As a natural byproduct of oil production, there are recorded spills in the northwest corner of the state. However, urban areas also have a high number of recorded spills with Fargo and Grand Forks ranking highly (NRC, 2023). This emphasizes the widespread and diverse range of spills reported. Spills and releases vary widely in volume with some spills requiring a formalized response, while others do not.

WebEOC and HazConnect can provide information about the number of incidents each year that can help us to determine the likelihood of an incident occurring in any given year. **Figure 4.11-10** shows the annual number of incidents reported to WebEOC in 2019 and 2020. HazConnect provides the most comprehensive data about HazMat incidents in North Dakota.

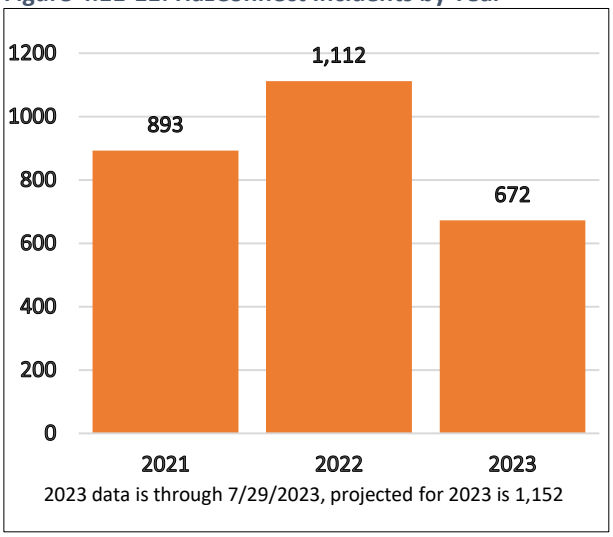
Figure 4.11-11 shows the number of incidents reported each year that HazConnect has been used through July 29, 2023. The first 27 days of 2021, HazConnect was not operational. Projecting for the full year, 2023 is likely to have the most incidents for the three years of HazConnect data with a projected 1,152 by the end of the year. In 2022, there were 1,112 incidents. An average of 1,050 incidents are reported into HazConnect each of its three years, with steady increases. Combining the two datasets, the state averages 982.2 HazMat incidents a year, or 2.7 per day.

Figure 4.11-10: WebEOC Incidents by Year



Source: WebEOC, 2021

Figure 4.11-11: HazConnect Incidents by Year



Source: HazConnect, 2023

For hazardous material release, the committee said the Central Plains facility in Hannaford contains 1.2 million gallons of propane and serves as a distribution point for the eastern part of the state. The increase in truck and rail traffic, in addition to Central Plains, was said to be the main reasons for the increased risk to hazardous material release in recent years.

(Griggs County Multi-Jurisdictional Hazard Mitigation Plan, 2022)

Figure 4.11-12 shows HazConnect incidents by lead agency and status (HazConnect, 2023). The Oil and Gas Division of the North Dakota Industrial Commission is the lead agency of 2,000 incidents since Jan 2021. NDDEQ has been assigned as the lead agency in approximately 600 incidents.

Figure 4.11-12: HazConnect Incidents by Agency and Status, 2021-23

Lead Agency	Active	Inactive	Total	Clearance
Oil/Gas	1,992	7	1,999	0.4 percent
DEQ	188	411	599	68.6 percent
Undetermined	26	51	77	66.2 percent
Agricultural	30	8	38	21.1 percent

Source: HazConnect, 2023

Figure 4.11.13 shows the type of incident. Oil and Gas spills represent 74.1 percent of all the cases, exceeding the amount assigned to Oil and Gas (HazConnect, 2023). It is important to note that the type of incidents may not reflect the lead agency. For example, NDDEQ may be assigned as lead agency for an Oil and Gas spill. Lead agency assignment is based on a number of factors including origin of the release, affected media, and other considerations. A review of the cases indicates that freezing in winter, equipment malfunction, and human error were significant contributors to all releases (HazConnect, 2023).

Figure 4.11-13: HazConnect Incidents by Type, 2021-23

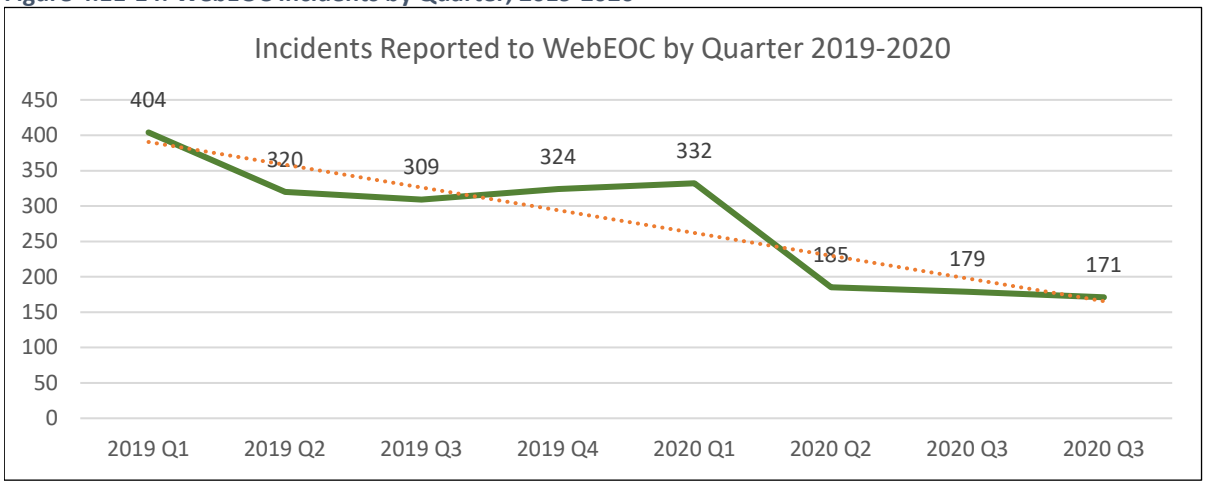
Incident Type	Incidents
Oil/Gas Spill	2,010
Environmental Incident	637
Undetermined	66

Source: HazConnect, 2023

A total of 76 percent of [Mountrail residents] said that it is very likely or somewhat likely that there will be a release from hazardous materials in transit. As most Mountrail County residents live, work or travel within the path of hazardous materials in transit, this is an important issue that should be addressed. *(Mountrail County Multi-Jurisdictional Hazard Mitigation Plan, 2022)*

Figure 4.11-14, **Figure 4.11-15**, and **Figure 4.11-16** look at the breakdown of incidents reported to WebEOC, and then to HazConnect by time of year and time of day. **Figure 4.11-14** looks at the breakdown of incidents by quarter to WebEOC, through 2019 and 2020. There is a downward trend, but this also represents some lockdown time during Covid when oil and gas demand was low.

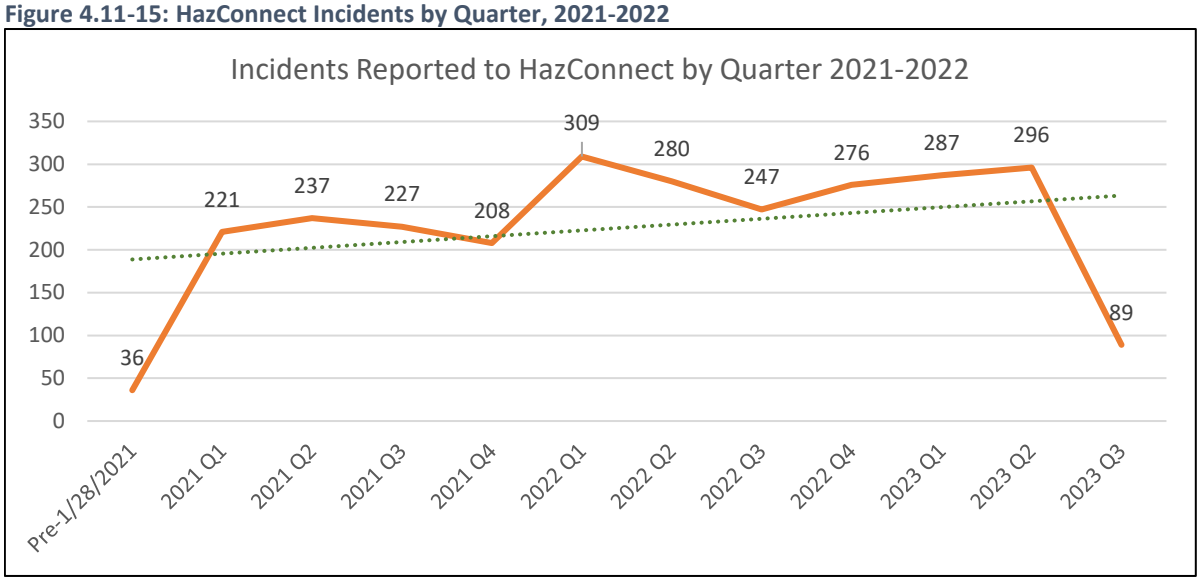
Figure 4.11-14: WebEOC Incidents by Quarter, 2019-2020



Source: WebEOC, 2021

Figure 4.11-15 shows the same breakdown of data for the HazConnect years. The first two quarters demonstrate a higher rate of incidents in the three years of data, which also was true for the WebEOC data. Incidents are generally increasing over time after COVID-19.

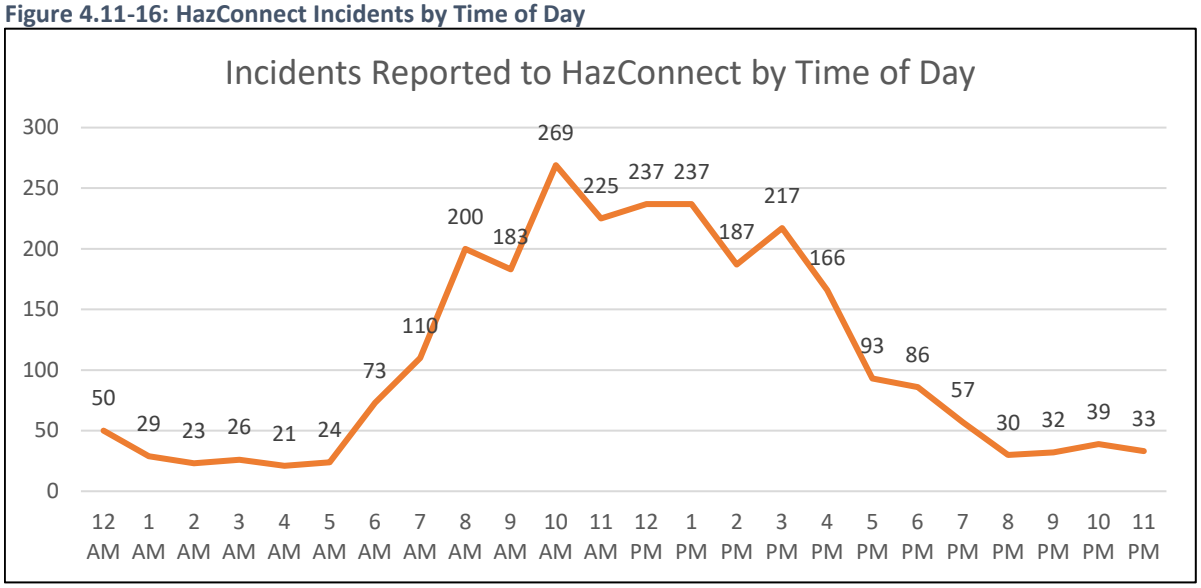
Figure 4.11-15: HazConnect Incidents by Quarter, 2021-2022



Source: HazConnect, 2023

Figure 4.11-16 shows the incidents broken down by time of day. The traditional workday has a substantially higher rate, with a peak at 10 a.m. (HazConnect, 2023). This same data is unavailable for WebEOC.

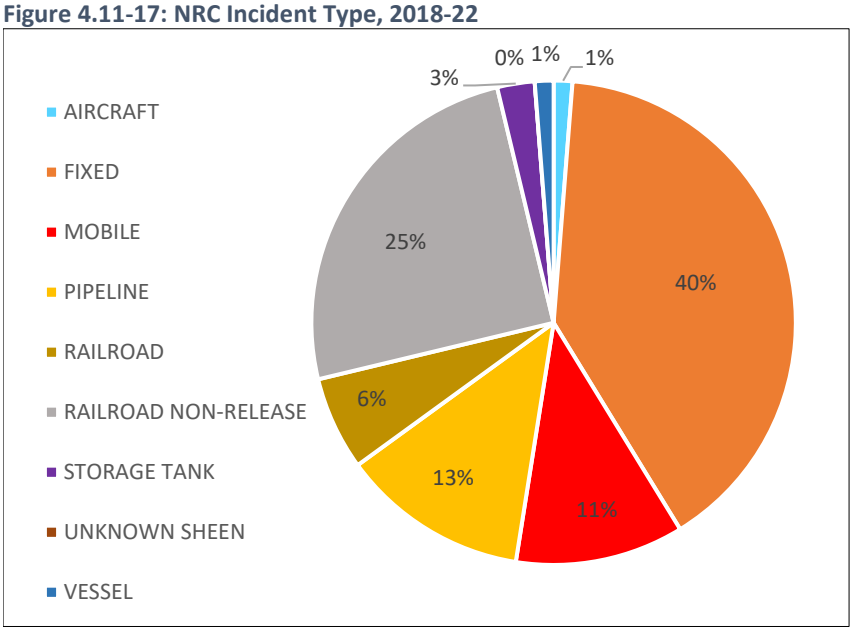
Figure 4.11-16: HazConnect Incidents by Time of Day



Source: HazConnect, 2023

NRC data extends over the Plan update period but includes only federally required Tier I substances. A breakdown of incidence types, shown in **Figure 4.11-17**, shows that from 2018 to 2022, 40 percent of the incidents reported to the NRC were from fixed facilities and another 31 percent were from railroads, but most were non-releases.

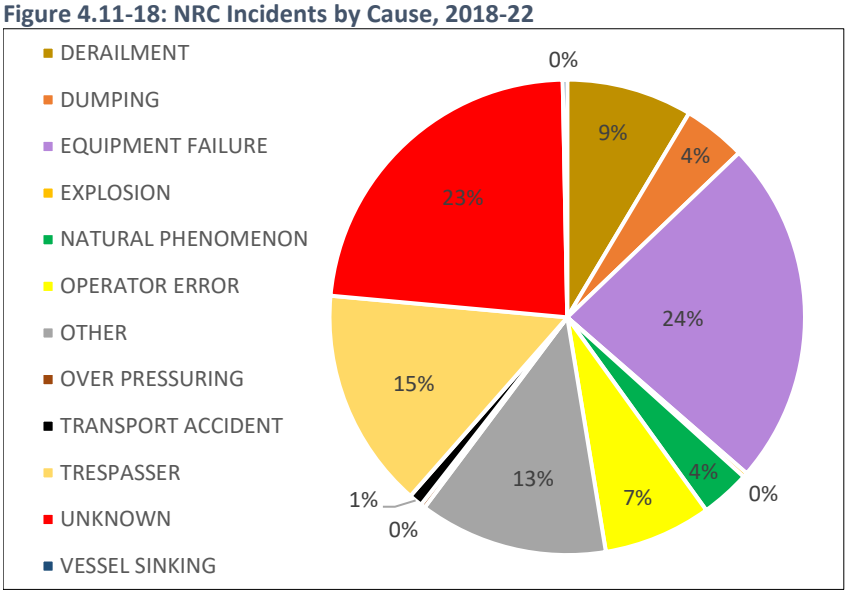
Figure 4.11-17: NRC Incident Type, 2018-22



Source: National Response Center, 2023

The cause of the NRC incidents from 2018 to 2022 are shown in **Figure 4.11-18**. Causes are distributed across several origins, but equipment failure was the highest with 24 percent, with trespassers the next highest known cause at 15 percent.

Figure 4.11-18: NRC Incidents by Cause, 2018-22



Source: National Response Center, 2023

Figure 4.11-19 looks at the NRC Incidents involving vehicles. There have been 8 to 9 incidents each year, and tanker trucks are the leading cause of the incidents.

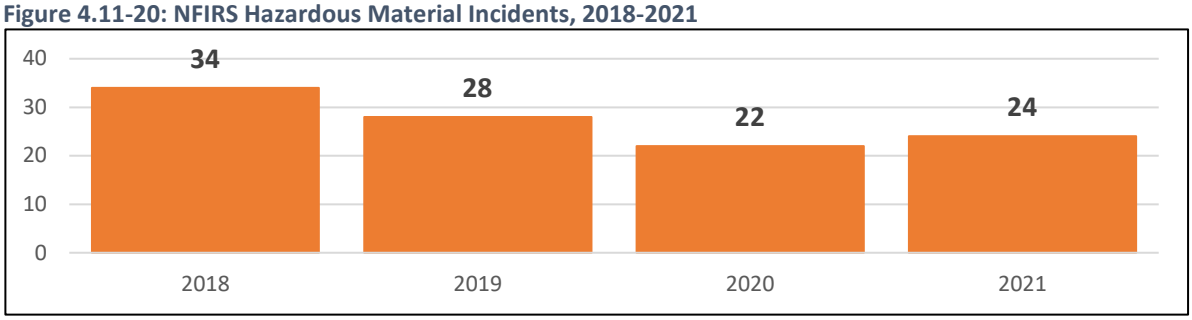
According to the Association of American Railroads, North Dakota has 3,223 miles of rail track, ranking it 16th in the nation in 2021. It is 23rd in the nation for obligated carloads (375,500) and 14th in originated rail tons (35.7 million tons). Since 2000, HazMat accident rates are 78 percent lower on railways (Association of American Railroads, 2021). Crude oil production outpaced pipeline capacity in North Dakota initially, and railroads and tanker trucks helped move crude oil during the last plan that today are shipped via pipeline.

Figure 4.11-19: NRC Incidents Involving Vehicles, 2018-22

Vehicle Type	2018	2019	2020	2021	2022
Commercial Truck	0	1	0	0	0
Construction Vehicle	0	1	0	0	0
Farm Vehicle	2	0	0	1	2
Other	0	0	2	1	0
Passenger	1	0	0	2	1
Tanker Truck	5	2	0	0	5
Tractor Trailer Truck	1	4	0	1	1
Total	9	8	2	5	9

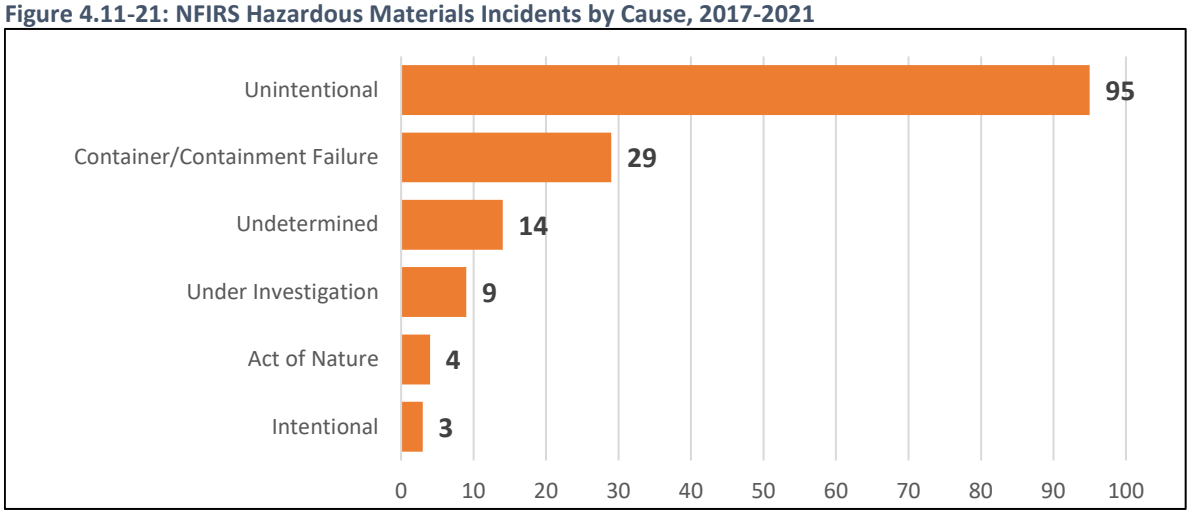
Source: National Response Center, 2023

Figure 4.11-20: NFIRS Hazardous Material Incidents, 2018-2021



Source: NFIRS, 2023

Figure 4.11-21: NFIRS Hazardous Materials Incidents by Cause, 2017-2021



Source: NFIRS, 2023

National Fire Incident Reporting System (NFIRS) HazMat data reports all incidents in which fire departments responded with HazMat resources. **Figure 4.11-20** looks at those incidents reported to NFIRS each year from 2019 to 2021. Although 2021 had two more incidents than 2020, there is a generally downward trend in the need for hazmat response from public fire departments. Previous data from HazConnect and NRC indicates that many incidents may have response from corporate safety teams (NFIRS, 2023). **Figure 4.11-21** examines NFIRS HazMat incidents by cause. Just more than 60 percent (95) were unintentional in cause, with containment failure a distant second at 29.

4.11.1.5 Warning Time and Duration

When planning for a response, it may help to classify mitigation efforts into four categories: Pre-Release, Active Release, Immediate Effects, and Long-Term Effects. Due to the highly variable nature of HazMat releases, the warning time and duration of each category can be difficult to describe. However, by classifying strategies into these four categories, responders can better direct resources and personnel.

- Pre-Release. Mitigation activities in this category can be seen as "preventative" methods. Ensuring compliance with all regulatory requirements, internal audits to ensure containment and notification systems are working appropriately, and other strategies can help increase the warning time of a release (through the use of various indicators and alarm protocols) and reduce the duration.
- Active Release. This category covers mitigation activities for when materials are actively being released (through a leaky container, a ruptured pipeline, etc.). Identifying response personnel, activating containment measures, or other emergency procedures for stopping releases are important to ensure the minimum amount of material is lost when an incident occurs. This is also when notification to off-site entities, such as fire departments, police stations, medical personnel, or state/federal regulators should occur.
- Immediate Effects. This category is concurrent with the Active Release but may persist after the release has been stopped. First responders and on-scene personnel are likely to be the ones implementing these mitigation strategies. Such strategies may include the berming of free-flowing liquids to prevent or contain off-site impacts, active removal of released material, or fire-fighting efforts.
- Long-Term Effects. Following the response of the event, the remediation and recovery process begins. Mitigation activities under this category will involve the responsible party, in coordination with state and potential private partners, working to understand and remediate the long-term impacts of the release. This may include various remediation strategies such as removal of contaminated material, on-site treatment of contaminated media, and long-term monitoring and assessments.

Categorizing mitigation efforts allows for emergency management experts and private partners to collaborate to inform a safe and comprehensive response and recovery. These planning efforts guide mitigation actions to be taken to minimize impacts overall.

4.11.2 Consequence and Vulnerability Loss Analysis

This section describes the consequences and vulnerabilities of a HazMat release. Both consequences and vulnerability will be discussed in this section.

A consequence is the "degree of debilitating impact that would be caused by the incapacity or destruction of critical infrastructure or a critical function." Consequences can be tangible impacts to buildings or systems or intangible impacts on processes, business, or reputation," (FEMA EMI, 2023). Consequences include debilitating impacts, such as the loss of critical functions, data, or public

confidence. It also includes cascading effects that may influence functionality of critical services such as the loss of service of a utility or communications.

Vulnerability is “susceptibility to physical injury, harm, damage, or economic loss.” It considers the extent of injury and damage that may result from a hazard event of a given intensity in a given area. This may be a geographic, social, or economic feature that makes harm from a hazard more likely or more intense.

4.11.2.1 Human Loss

HazMat releases have the potential to cause short and long-term harm to human health. Specific impacts are dependent upon the type of material released, and the medium of exposure. Common short-term effects of HazMat releases may include nausea, headaches, difficulty breathing, skin reactions, or other acute symptoms (EPA, 2023). Long-term health impacts may include cancer, behavioral abnormalities, or physiological malfunction (i.e. reproductive impairment, kidney failure, etc.).

> The new Napoleon Care Center is adjacent to the railroad, airport, and agronomy storage facilities. Those with functional needs assistance may be more vulnerable to a spill if there is an urgent evacuation needed.
>
> *(Logan County Multi-Jurisdictional Hazard Mitigation Plan, 2022)*

This section reviews the human health impacts from some of the most prevalent hazardous materials released in North Dakota. For information on a hazardous material not covered in this section that may be locally prevalent, check with the Agency for Toxic Substances and Disease Registry (ATSDR) at https://www.atsdr.cdc.gov/. For personal exposure, call the local emergency number or consult with the North Dakota Poison Center, which is staffed 24 hours a day, at 1-800-222-1222.

Ammonia (often encountered as anhydrous ammonia) is a colorless gas with a strong odor. It is a naturally occurring substance and an important source of nitrogen, which is necessary for human and plant life. It is also a common component of fertilizers and cleaners, and is also used as a refrigerant gas, for purification of water supplies, and in the manufacture of plastics, explosives, textiles, pesticides, dyes, and other chemicals. Ammonia is even generated inside us by bacteria in our intestines. Ammonia gas seeks water for chemical reaction, and thus ammonia gas quickly impacts living things and water ways that it is exposed to and can be harmful in a very short exposure (ATSDR, 2023). HazMat incidents like the one in Minot back in 2002 can be particularly damaging to the public, while occupational exposure to areas with concentrated ammonia such as industrial cleaners, fertilizers or in an enclosed building with a lot of animals can also be extremely dangerous to health.

The Oil and Gas industry is a key factor of North Dakotas economy producing over one million barrels of oil per day since 2014 (NDDMR, 2020). Pumping oil can be a dangerous job due to environmental factors and potential exposure to risk. There are many ways that oil wells can be drilled to maximize output, however, the most common type is a conventional well (University of Calgary, 2021). The well is drilled vertically downward using a steerable device to access the oil and gas reservoir rock formation. The crude oil will often have enough force to move into the well naturally as it is liquid. The crude oil can then be stored and processed for consumer use (University of Calgary, 2021). The intended product and byproducts can be harmful to human life.

Produced water – a byproduct of oil production made up of salty water, hydrocarbons, and other possible materials – may also pose threats to human health. While produced water is typically more associated with natural resource impacts, it can also represent a threat to human health. Contact with skin can cause irritation, petroleum vapors may cause respiratory issues, and there may other considerations such as hydrogen disulfide (H_2S) gas presence.

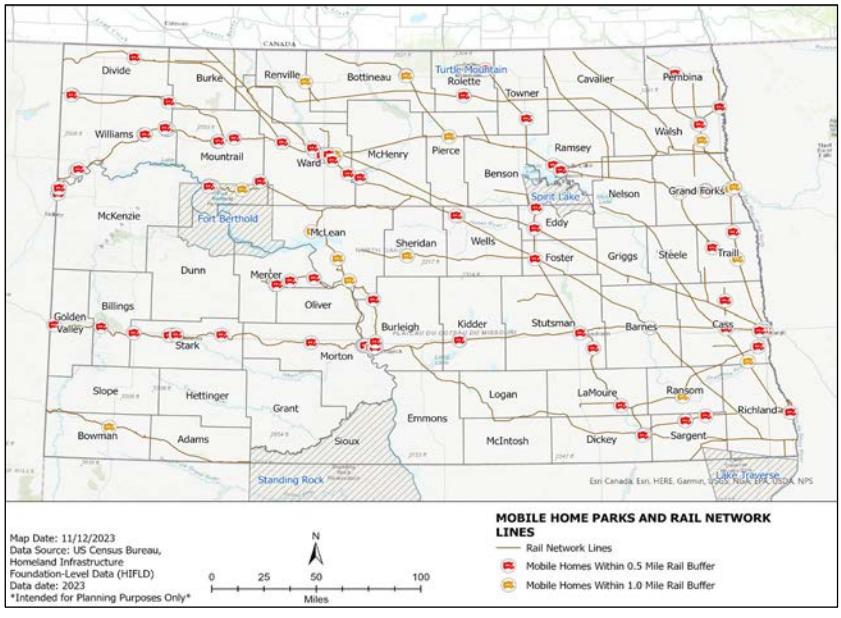
People living in areas within the state with high pollution may be more vulnerable to impacts due to prolonged exposure. They may be more prone to heart attacks, according to medical studies (Christensen, 2023). Pollution, much like extreme weather, can overtax the body. Frequent exposure to contaminants may cause elevated risk of acute and chronic health conditions. Those with heart or breathing problems in these areas of high pollution face an elevated risk.

The hazardous materials industry has many benefits and consequences. Being that Three Affiliated Tribes land is entirely within the Bakken Oil Production area, there is a strong industry presence. Bringing income into The Three Affiliated Tribes has helped fund new schools, buildings, and enhanced law enforcement. Living near oil production may pose exposure to higher rates of pollution and a greater risk for exposure to HazMat incidents and natural gas flares, which release other potent greenhouse gases such as methane and carbon dioxide (Stanford, 2021). The complexity of oversight on Native lands may increase tension between public, private, and tribal partners.

Historically, minority and impoverished populations may have a higher burden of environmental pollution because economics and social policy leads to undesirable land uses being located in these communities, identified now in policy as environmental justice communities.

Children and the elderly are often less capable of enduring pollution without negative consequences for their health. In children, smaller, still-developing bodies reach dangerous levels of toxins earlier. The elderly often have coexisting conditions and/or compromised immune systems that create cascading health issues. The type of housing a person takes shelter in from a hazardous materials accident can determine how effective sheltering is. Sheltering in place can be counterintuitive for temporary and some manufactured housing that can allow for infiltration of dangerous chemicals and trap aerosols, increasing harm. Explosive incidents may cause more damaging fires in such structures. **Figure 4.11-22** shows the locations of mobile homes parks as they relate to rail lines. There are 105 mobile homes in the state within a 0.5-mile buffer, and 153 within a mile of rail lines.

Figure 4.11-22: Mobile Homes and Rail Lines



Source: ACS, 2023, HIFLD, 2023

4.11.2.2 First Responders

While responders have been trained to protect themselves and deploy the APIE (Analyze, Plan, Implement, Evaluate), approach to protecting themselves and the public, they are still the first line of defense, and face hazardous materials at a closer distance and higher concentration than the general public. They use best practices, assistance and consulting from the National Response Center, and Personal Protection Equipment to protect them from harm. Local and Tribal hazard mitigation plans can help prepare first responders by identifying the hazardous materials most prevalent in their locality, which may differ from the aggregated state data. Larger events may call on Regional or National Response Teams as dictated by the federal National Contingency Plan. Training for HazMat incidents falls to local responsibility (Hazmat Nation, 2020). The state of North Dakota faced no reported first-responder losses of life during the plan update period (NFIRS, 2023). Nationally, 1 percent of firefighter injuries occur from exposure to chemicals or radiation.

> Buildings and property located near or adjacent to transportation modes, such as highways, railroads or airports are more at risk as the hazard typically occurs during transportation of hazardous materials. The Pierce County Courthouse and the Pierce County Law Enforcement Center are located blocks from railroad, pipeline, and highway infrastructure. *(Pierce County Multi-Jurisdictional Hazard Mitigation Plan, 2018)*

The most vulnerable first responders are the first to arrive on the scene. In some instances, especially in occupational incidents, that first responder may be the nearest colleague. Levels of basic hazmat safety may differ from facility to facility, and those with minimal training may put workers at higher levels of peril during an incident.

4.11.2.3 Environmental, Natural, and Cultural Resources

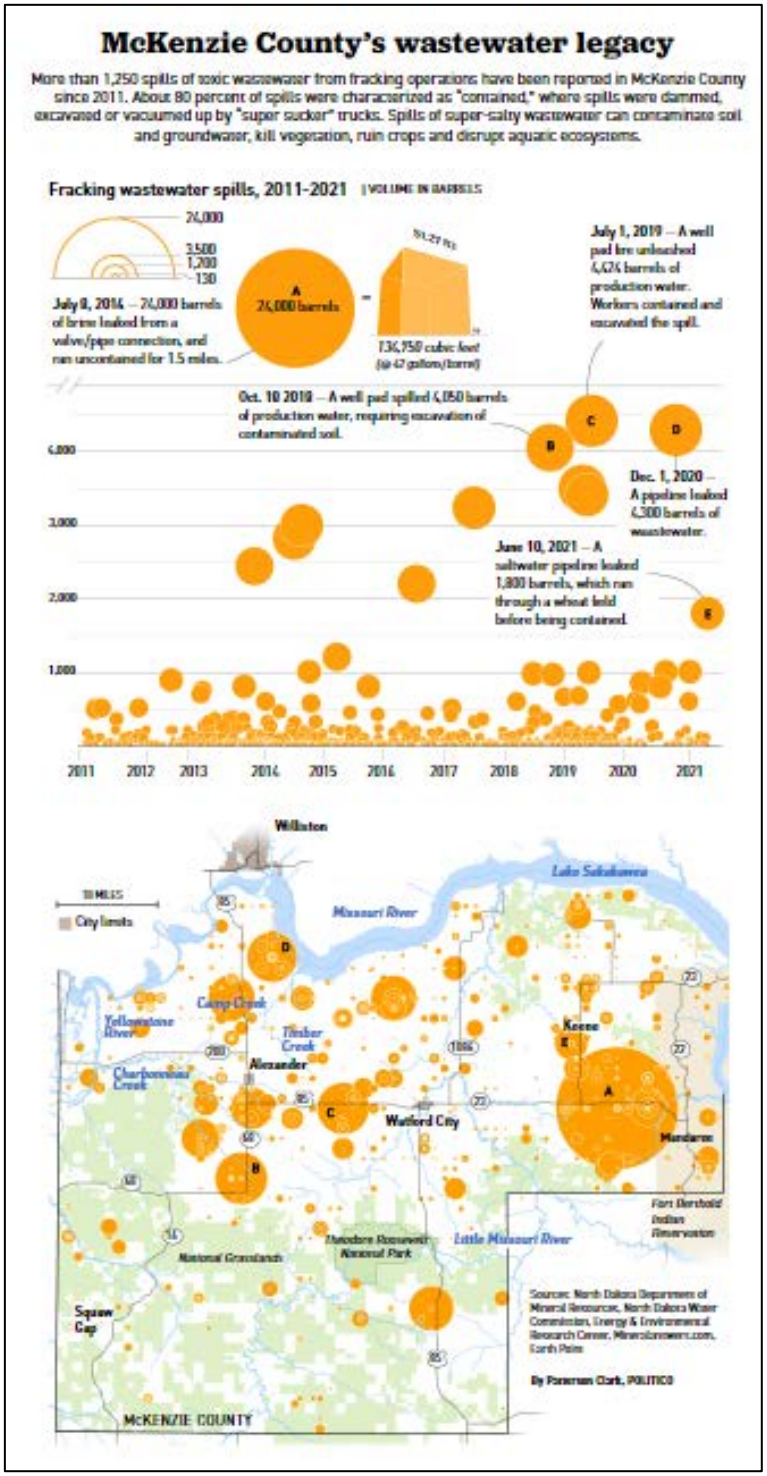
HazMat releases can impact environment and cultural resources as well. The material may be actively destructive to the environment or the resources within it; or the removal of the material may lead to the destruction or damage of those resources.

Fertilizers and pesticides that run off fields can make their way into waterbodies. Incidents in which these hazardous materials are spilled or otherwise accidentally released can cause issues, too. Pesticides can cause harm and death to otherwise beneficial species such as pollinators and insects and other animals that prey on pests (UN Environment Programme, 2022). They can build up in mammals including humans and livestock, causing illness and death. Fertilizers can cause unintended and undesired growth in runoff areas and water bodies. This can lead to algae blooms that kill fish and other aquatic species and contaminated drinking water.

Vulnerability of critical infrastructure and the environment to hazmat incidents can be very controversial, especially when citizens feel as if they have limited voice in decisions. The protests against the Dakota Access Pipeline construction on the Standing Rock Indian Reservation was about protecting the Tribal water source and sacred lands from future HazMat incidents from the hydrocarbon pipeline that was to be, and has since been, constructed under the lake and through sacred lands. Hazmat incidents have occurred on the pipeline in other locations since construction, demonstrating protester concerns.

A study on hydraulically fractured wells, which included North Dakota, found that with every 1,000 wells drilled, there were 55 reported oilfield spills (this excludes those from transportation away from the oilfield in pipelines or other forms), with a median spill size of 210 gallons in North Dakota between 2005-2014 (Allison & Mandler, 2018). Most occurred in the first three years of a rig's existence and involved the spilling of produced water, a byproduct of oil production that includes naturally occurring brine and hydrocarbons. This highly salted material is up to 15 times saltier than seawater and can kill plants and contaminate the soil to the point that nothing will grow on it for years. It may also contaminate groundwater, impacting the potability of well water.

Figure 4.11-23: McKenzie County Oil Spills, 2011-2021



Source: Clark, Politico, 2021

Where agriculture and the oil industry intersect in western North Dakota, there is a delicate balance between the state's top industries. Produced water that exceeded containment during the 2020 Alexander tank fire contaminated farmland and a freshwater spring before reaching Timber Creek, which flows into Lake Sakakawea, part of the Missouri River system. After professional clean-up and three months, levels in the wetlands between the springs and the creek exceeded acceptable limits by 600 percent. Such an event is not uncommon in McKenzie County, shown in **Figure 4.11-23**, and elsewhere in the western North Dakota counties (Haines, 2021). Releases of produced water can impact drinking water, water quality, biodiversity, water availability for cattle and agricultural productivity.

Orphaned wells which have been removed from production pose a threat to nearby lands and waters as well. Nationally, about 50 percent of all drilled oil wells have not produced oil since 2014. Law requires abandoned wells to be plugged, but these plugs are not monitored or confirmed, and responsibility for the damage of unplugged wells or damaged plugs falls on the former operator. Less productive wells are often off-loaded to smaller companies which are less likely to still be in operation or financially solvent when the time comes to plug wells or to pursue liability for leaks and damage, creating orphan wells. Responsibility for these orphan wells then falls to the state or the affected landowner. Deep wells, like those that predominate in North Dakota, are more costly to plug than most, making the inability to pay for proper decommissioning a little higher (Schuwerk and Rogers, 2020). North Dakota's oil industry is also relatively young, making these issues likely to grow. Deep wells typically have shorter lifespans, accelerating the growth of this issue. State bonds to address this risk are estimated to cover about 1 percent of the actual costs of capping orphan wells.

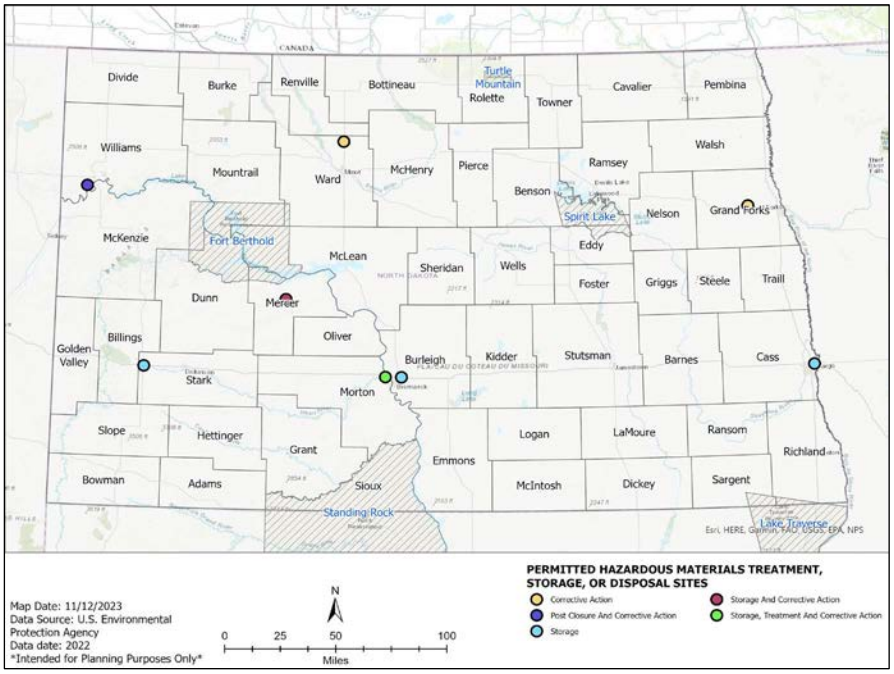
4.11.2.4 Property, Facilities, and Infrastructure Damage

Property, Facilities, and Infrastructure can be physically damaged by hazmat incidents. Areas near HazMat material storage facilities can be particularly vulnerable. Occupational sites and tank farms are not just vulnerable from traditional accidents and human error, but are also vulnerable to lightning, wildfires, tornadoes, blizzards, and floods. Areas where or near where hazardous substances are stored for use or transportation can be particularly vulnerable. Occupational sites and tank farms are not just vulnerable from traditional accidents and human error, but also to the natural element.

Some critical infrastructure is more vulnerable than others. Drinking water intakes can be contaminated by a nearby spill. In addition to impacting drinking water facilities, a hazmat incident could occur where there is critical infrastructure that stores and uses hazardous materials. Well water can also risk contamination from incidents that reach aquifers.

Figure 4.11-24 shows the sites where hazardous waste has been permitted for treatment, storage, or disposal. There are eight sites in North Dakota, including the two military bases. Not shown are the approximately 160 facilities in the state that store and use radioactive material (NDDEQ, 2023). These facilities produce an average of three incidents each year that

Figure 4.11-24: Hazardous Materials Treatment, Storage, or Disposal Sites



Source: EPA, 2022

require inspection. These facilities include medical facilities, radiography facilities, well logging facilities, and research or laboratory facilities.

4.11.2.5 Critical Facilities, Community Lifelines, and State Assets

HazMat incidents can occur anywhere in the state, and thus can impact schools and hospitals. When hospitals are affected, the impact can be severe on those already ill. The rural nature of the state can mean that an impacted hospital creates a substantial increase in distance for victims to seek treatment and can put pressure on the state's healthcare system, representing a vulnerability for the state. Schools and hospitals near areas where there is known storage and use of hazardous materials may be at increased vulnerability to an incident.

4.11.2.6 State Economy and Economic Disruption

In addition to some of the agricultural impacts discussed above, HazMat incidents can impact other sectors of the state economy.

Figure 4.11-25 shows the responsible party for all federally reported incidents from 2018 to 2022. While most incidents did not identify a responsible party (116), the oil and gas (105) industry had more than all other identified parties' assigned responsibility.

Figure 4.11-25: Responsible Party in NRC Incidents, 2018-22

Responsible Party	Incidents
Unassigned	116
Oil and Gas Company	105
Other Industry	40
Logistics	20
Railroad	16
Retail	14
Military	8
Utility	7
Government	5

Source: National Response Center, 2023

Industry-wide, 489 oil and gas workers were killed on the job between 2013 and 2017, with an average of 1.3 nonfatal occupational incidents a day (OSHA, 2021). Mechanical stress, high-pressure line and equipment failure, electrical hazards and explosions and fires are all risks to oil and gas workers, although transportation incidents are the deadliest. This sector of employees faces one of the highest risks of injury compared to other industries. There are measures that can be taken to improve the likelihood of survival, including explosion-proof radios, continuous monitoring of pipelines for vapor escape, training for unscheduled work and repairs and hazardous chemical sensors (Iakovlev & Pesterev, 2022). For an industry that struggles with a global labor shortage in a comparably worse climate than in other oil-producing states, safety can have a significant impact (Shan, et al. 2022). The perception of occupational health risks negatively impacts job satisfaction and increases worker stress. The impacts of a strong safety culture in an organization can impact employee commitment to their organization.

Figure 4.11-26 shows the number of closures of roads and rail tracks in North Dakota from federally reported incidents to the NRC. The number of rail closures ranges from 2 to 16, annually, and road closures average from 2 to 5, annually, with no apparent trend. Closures result in increased costs for logistics, and loss of productivity in the manufacturing sector due to work and material delays.

Figure 4.11-26: NRC Incidents Resulting in Rail Track Closures, 2018-22

Year	Incidents	
	Rail Track Closures	Road Closures
2018	2	2
2019	15	3
2020	12	2
2021	9	5
2022	16	2

Source: National Response Center, 2023

Figure 4.11-27 shows the substances that were spilled into North Dakota from federally reported derailments. Most of the substances released into the state were not hazardous; however, ammonia compounds (irritant) and hydrochloric acid (corrosive) were released in derailments between 2018 and 2022.

Figure 4.11-27: Materials in Derailed Rail Cars in NRC Incidents, 2018-22

Materials in Derailed Car	2018		2019		2020		2021		2022	
	Inc	Cars	Inc	Cars	Inc	Cars	Inc	Cars	Inc	Cars
Diatomaceous Earth	1	3	0	0	0	0	0	0	1	3
Ammonium Bisulfate	1	3	0	0	0	0	0	0	1	3
Corn	1	6	0	0	0	0	0	0	1	11
Empty	0	0	0	0	1	1	0	0	0	0
Flour	0	0	0	0	1	3	0	0	0	0
Grain	1	3	0	0	1	21	0	0	0	0
Hydrochloric Acid	2	32	0	0	0	0	0	0	1	3
Freight	0	0	0	0	0	0	1	19	2	32
Diesel Locomotive	1	1	0	0	0	0	0	0	1	1
Polyacrylamide	0	0	1	19	0	0	0	0	0	0
Sand	0	0	0	0	1	11	0	0	0	0
Soybeans	0	0	0	0	1	6	0	0	0	0
Vegetable Meal	0	0	0	0	0	0	1	6	0	0
Totals	**7**	**48**	**1**	**19**	**5**	**42**	**2**	**25**	**7**	**53**

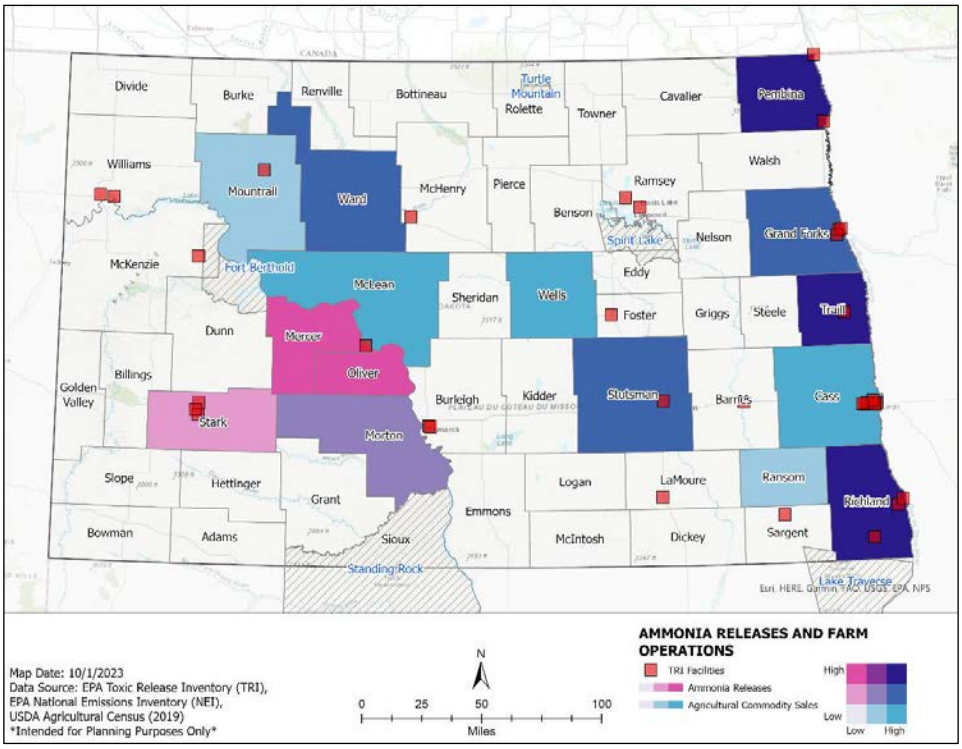
Source: National Response Center, 2023

The dominance of oil and gas and agriculture present specific vulnerabilities for North Dakota. These industries rely on hazardous substances.

The oil and gas industry in North Dakota competes with warmer states for skilled and experienced labor, and many of those experienced workers gained their experience in those warmer states, where they prefer to live. This puts North Dakota's oil patches at a slight disadvantage for skilled oil labor. This leaves less-experienced workers in positions working with hazardous substances, increasing the likelihood of human error (Willis, 2021). The cold weather can also cause more issues with the freezing of equipment, leading to equipment malfunction that can cause HazMat incidents.

Ammonia can be a suitable fertilizer, but concentration of ammonia can be harmful to human health. **Figure 4.11-28** shows areas where there are areas of farm operations and ammonia releases, creating areas with higher risks of incidents or individuals with higher risk. Counties shaded in pink represent levels of ammonia emissions from the EPA National Emission Index while counties shaded light blue represent the volume of agricultural commodity sales. Counties shaded deep purple, such as Pembina, Traill, and Richland are the locations where ammonia emissions and farm operations coincide the most. Concentrated animal feeding operations can also concentrate ammonia, presenting an occupational risk to workers.

Figure 4.11-28: Ammonia Releases and Farm Operations



Source: EPA, 2023, USDA, 2019

4.11.2.7 Delivery of Service and Continuity of Operations

Large events may require the deployment of state resources and capabilities. HazMat incidents that impact waterways have the possibility of contaminating drinking or recreational waters, impacting the delivery of water services or the safety of fishing and swimming as well.

Hazardous material incidents are unlikely to impact most state service delivery or operations. However, the ND Division of Homeland Security Offices, the primary State Emergency Operations Center, Watch Center, State Radio Dispatch Center and ND National Guard facilities at Fraine Barracks are immediately adjacent to the Burlington Northern Santa Fe (BNSF) rail line. A rail transportation incident involving hazardous materials release at this location has the potential to disrupt state emergency response. An evacuation or shelter-in-place order could each expose staff to life threatening chemicals and limit access of other emergency response personnel such as Emergency Medical Services. Establishment of an alternative emergency operations center and dispatch center would need to occur with staff from other state agencies and/or off duty staff identified in the continuity of operations plan lines of succession and would delay the initiation of a coordinated response.

4.11.2.8 Public Confidence in the State's Governance

One change that the state has made since the last plan was to create a uniform oilfield safety program. The North Dakota Safety Council and the Workforce Development Council partner to conduct and credential training, ensuring that a credentialed worker is familiar with state safety procedures and expectations (Shan, et al., 2022). These actions demonstrate to the public and the industry that the state is going to be innovative and proactive in avoiding oil and gas hazmat incidents (Dura, 2019). This also stands to gain workforce confidence in the safety of oil and gas safety culture in North Dakota, building more organizational loyalty, and generating a more experienced workforce.

4.11.2.9 Estimation of Annual Losses

Hazmat incidents can cause injury to people, damage to property and infrastructure, and can contaminate water supplies and other environmental resources. **Figure 4.11-29** shows the consequences of NRC-reported incidents between 2018 and 2022 (NRC, 2023). During an average year, the state can anticipate about 66 incidents, 4.8 fatalities, 3.8 injuries with 2.8 requiring hospitalization, and 78 people evacuated. However, larger incidents that exceed annual numbers are possible, as occurred in the Minot train derailment.

Figure 4.11-29: NRC Incidents Consequences, 2018-2022

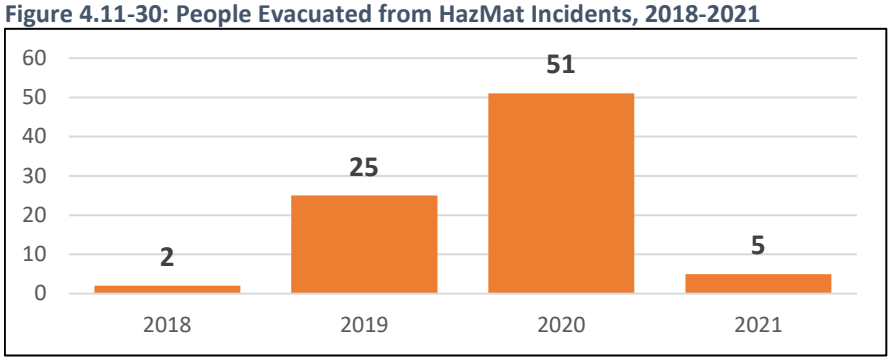
Year	Incidents	Fatalities	Injuries	Hospitalized	Evacuated	Damages
2022	80	7	5	3	120	$300,000
2021	45	4	1	0	0	$150,000
2020	50	2	3	3	120	$200,000
2019	75	4	5	5	30	$350,000
2018	80	7	5	3	120	$300,000
Annualized	**66**	**4.8**	**3.8**	**2.8**	**78**	**$260,000**

Source: National Response Center, 2023

Figure 4.11-30 shows the number of people evacuated from a fire department-response HazMat incident reported to NFIRS, with an average of 20.75 people evacuated each year in North Dakota between 2018 and 2021.

Internationally, the World Economic Forum estimated the impact of pollution to the world economy is $2.9 trillion annually or 3.3 percent of the world gross domestic product each year, when also considering the costs of accidents, lost work productivity, deaths, medical treatment, and disability from pollutions (McCarthy, 2020).

Figure 4.11-30: People Evacuated from HazMat Incidents, 2018-2021



Source: NFIRS, 2023

4.11.2.10 Community Resilience

In addition to creating baseline safety training for oil industry workers, as North Dakota has, there are actions that FEMA has suggested in the following areas in which communities can build resilience to HazMat releases.

- Land Use Policies, which consider the proximity of facilities and substances to populated areas and overburdened populations, and/or that require coordination with first responders to set up emergency plans for facilities with hazardous substances.
- Creating Local Emergency Planning Committees, which include representatives from facilities that have hazardous substances, and those who will need to be involved in response to an incident, such as healthcare facilities, water systems and school districts.
- Training and exercises, in which response protocols are reviewed and practiced.
- Public Information and Warning Systems that include information about steps the public can take to protect themselves and assure that this information is disseminated in a manner that reaches everyone in the community (FEMA, 2019).

4.11.2.11 Future Conditions

Through the end of this century, expect larger and more intense wildfires, floods, and both summer and winter storms with increasing frequency of heavy precipitation, heavy wet snow, mixed precipitation or ice storms, and related hazards that pose a risk to both the transportation of hazardous materials within the state and the facilities where such materials are used or stored. The following list is based on information extracted from the NOAA National Centers for Environmental Information, summary for North Dakota (Frankson, 2022), the Fifth National Climate Assessment (Knapp, 2023), and related resources:

- **Location.** Hazardous material releases are possible throughout the state.
- **Extent/Intensity.** Hazardous material releases may increase as both a direct and an indirect result of climate change.
- **Frequency.** The frequency of hazardous material releases may increase as both a direct and an indirect result of climate change.
- **Duration.** The duration of hazardous material releases may or may not change.

Warmer temperatures may result in expansion of gases, increases in biologic agents, or other such actions that could put hazardous material storage containers and/or facilities at an increased risk.

Increased summer and winter storms, wildfires, floods, transportation incidents, etc. could indirectly put hazardous material containers and/or facilities at an increased risk.

A Hazardous Material (HazMat) Release refers to the improper leak, spillage, discharge, or disposal of hazardous materials or substances which poses a significant threat to human health and safety (DHS, 2023; FEMA, 2019). HazMat releases can occur at fixed facilities and in transport, as the result of various natural hazards such as floods, wildfire, summer or winter storms, icy road or rail conditions, or power outages caused by other hazards.

4.11.2.11.1 Extreme Climate Variability and Climate Change

Through the end of this century North Dakota's natural yet extreme climate variability will likely continue to be the primary influencer or signal within each of the natural hazards which directly or indirectly impact jurisdictions and peoples across the state, over days to decades-long timescales. The much more subtle and gradual trends of climate change over the rest of this century may further extend the range of such variability beyond that which has previously been documented in the historical record.

Recent climate change trends have shown, and future projections suggest, that the state can expect continued gradual warming in all seasons, with greatest warming in the winter season (Swain, 2015). Overall precipitation is likely to increase, but with a high degree of inter-seasonal and interannual variability, which could lead to longer and stronger droughts, with a proportionate increased risk of wildfire, interspersed with more frequent and more intense flooding. Severe summer and winter season storms, with strong to extreme winds which often affect power grids and transportation corridors, will likely continue to occur in both drier, drought-prone periods, and wetter, flood-prone periods within the state's overall extreme climate variability.

A 2022 Government Accounting Office (GAO) study found that about 31 percent of Risk Management Plan (RMP) facilities, like chemical manufactures and water treatment plants, are in areas where natural hazards that may be exacerbated by climate change regularly occur (GAO, 2022). In North Dakota, this includes 36 facilities in either a High Wildfire Risk Potential area or a Moderate to High Flood Hazard area (GAO: Interactive Map, 2022). That report concludes that natural hazards have demonstrated the potential to trigger fires, explosions, and releases of hazardous materials at facilities (Trager, 2022). Threatening wildfires may also result in power outages which could affect the safe operation of these facilities.

4.11.2.11.1.1 Impact

Within the state, and across the Northern Great Plains (NGP) in general, climate trends and projections indicate that warmer temperatures will support a higher incidence of mixed precipitation (sleet), freezing rain, or ice storms (Easterling, 2017). This may lead to a higher incidence of transportation impacts (walkway, roadway, and rail impacts) and power transmission impacts, such as ice loading on wires with or without wind effect on power lines.

4.11.2.11.1.2 Adaptation

Direct impacts from extreme climate variability, current trends, or projected climate change on hazardous material releases in the NGP region are mainly associated with overall warmer conditions and the possible over-pressurization in containers due to expansion of gases. An adaptation measure could involve the adjustment of storage practices to account for potentially warmer and wetter conditions. For example, the EPA (Strategies for Climate Change Adaptation, 2023) recommends the use of bioretention structures, permeable pavement, underground storage, or extended retention wetlands, where appropriate, as methods to reduce runoff peak volumes and to prevent harmful chemical or excess nutrients from moving directly into drainage systems. Volatile chemicals may need to be stored in climate-controlled environments previously unneeded (ILO, 2023: Chemicals and Climate Change in the world of work). And workers exposed to warmer environments will likely need further protection from the inhalation or absorption of dangerous chemicals or their increased fumes.

4.11.2.11.1.3 Mitigation

The potential increase in other natural or technological hazards would be the primary indirect cause of a HazMat incident, and measures which reduce impacts from those hazards should have the added benefit of reducing HazMat incidents. Thus, there are no additional mitigation actions proposed at this time other than those already suggested as part of other hazards.

4.11.2.11.2 Other Changes

From a national security standpoint, climate change may be a threat capable of multiplying and aggravating already existing problems (water shortages, droughts, etc.) as well as generating fertile ground for future security threats.

According to sources, USAR (2005) and Aribigbola (2013) and as discussed in other technological or civil hazard profiles, most civil disturbance, crime, or terrorist activity results from societal reasons such as economic hardship, social injustices, ethnic differences with long-standing oppression by a group of people towards another, objections to world organizations or certain governments, political grievances, and terrorist acts.

Future climate projections through the end of the century do indicate the potential for increased societal insecurities and instabilities (Hoegh-Guldberg, 2018), including places like the Northern Great Plains region as exemplified by recent Dakota Access Pipeline (DAPL) civil unrest (Powys-Whyte, 2016; Levin, 2016; EELP, 2023). Also, increased levels of social unrest or disorder could lead to increased events involving HazMat materials.

One change that has occurred in the state and continues since the last plan update is the change in transportation methods of hazardous substances to and from the oilfields. At the last plan update, much of the crude oil, byproducts and produced water were transported by rail and on highways throughout the state to refineries in the state and in other areas of the country. There has been more downstream development in oil infrastructure and disposal since. Creation of pipelines limits the use of rail- and road-transportation and limits the likelihood of incidents in these pathways. While pipeline incidents do occur, they can be monitored, limiting risk, especially in heavily populated areas.

Disposal improvements including deep wells are also increasing in the state, limiting the waste sent on highways or rail cars. As of the year 2020, about 100,000 tons of radioactive oil field waste had been shipped out of the state on trucks bound for Montana, Idaho, Colorado, and Oregon. Not without controversy from local politicians and residents, the state began to approach this problem in 2016,

Figure 4.11-31: Radioactive Filter Socks Dumped in Noonan

Source: North Dakota Department of Health and Human Service, 2014

when it increased the level of radioactivity that landfills could receive. This has been followed by proposals to store radioactive material deep underground via a well contained by rock and/or salt, as is done in Louisiana and Alaska. A slurry well was opened in Johnsons Corner in 2021. Additional slurry wells are under consideration north of Lake Sakakawea and near Killdeer. Slurry wells cannot accept all radioactive waste generated by the oil and gas industry in North Dakota. Two landfills in Williams County have filed applications to receive what the wells cannot take. These developments limit the exposure for much of the state and minimize the road miles this dangerous waste travels, but it does concentrate the problem within western North Dakota.

The western North Dakota Counties of Dunn, McKenzie, Mountrail, and Williams have grown at a rate of 72.3 percent since 2010 (U.S. Census Bureau, 2020), and growth is expected to continue at a rate of 54.9 percent. This has already led to new development in areas like Williston, Minot, and Dickinson and the rural areas between them. Accommodating the booming oil and gas workforce and their young families will increase development and critical infrastructure in these areas, placing more people and property at risk from harm from hazmat releases.

4.11.3 Risk Analysis

Risk can be defined as the potential for loss of or damage to an asset (FEMA EMI, 2023). This section analyzes the potential for loss or damage in the state of North Dakota.

4.11.3.1 National Risk Index

The National Risk Index does not evaluate this hazard.

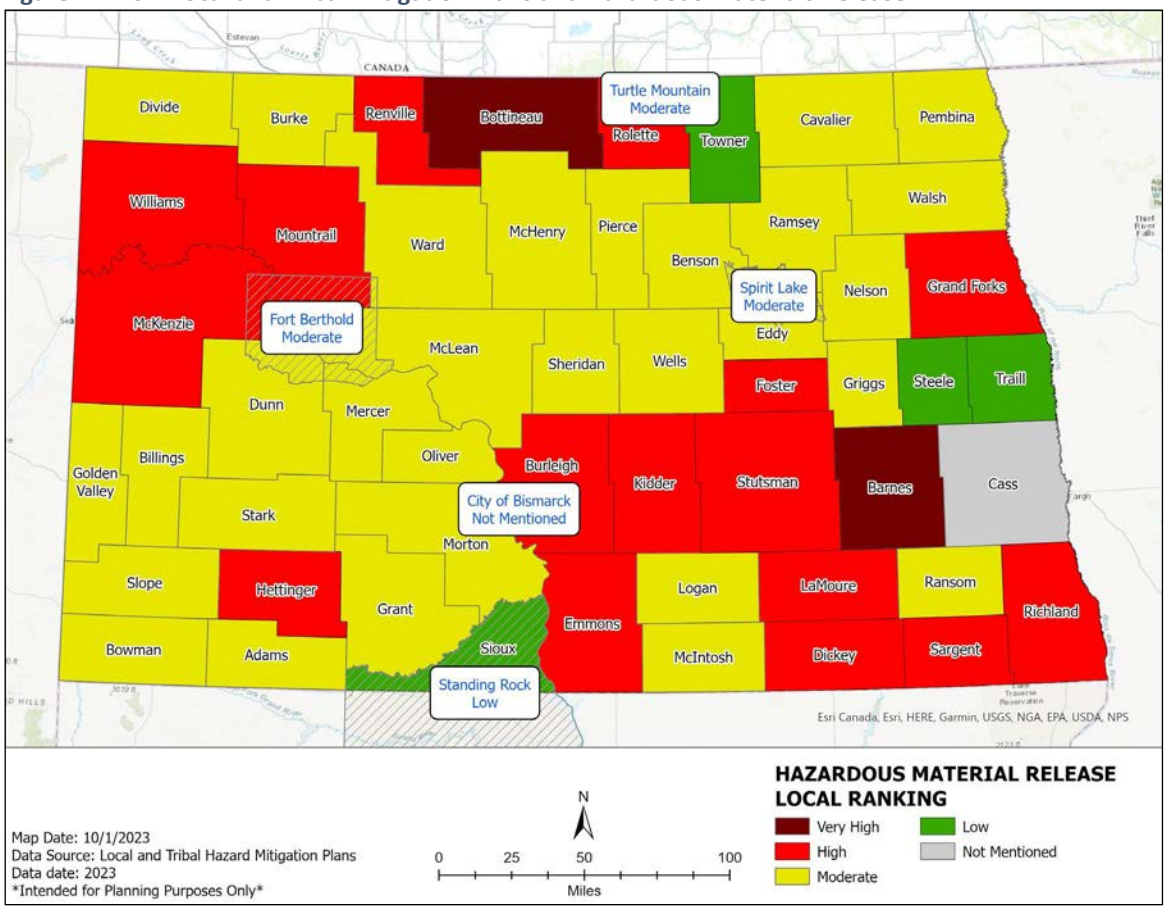
4.11.3.2 Risk Index Score

The Priority Risk Index for this plan update ranks HazMat releases as a moderate risk with a score of 2.2. Hazardous Materials Release is tied with space weather and criminal attacks for 9th of 15 hazards.

4.11.3.3 Jurisdictions at Risk

Figure 4.11-32 shows how the state's local hazard mitigation plans evaluated HazMat releases. When evaluating local and tribal mitigation plans, 56 of the 58 adopted plans identify HazMat releases as a hazard impacting their jurisdiction. However, of all plans that ranked hazards, 33 considered it a moderate risk, and 18 considered it high or very high.

Figure 4.11-32: Local and Tribal Mitigation Plans and Hazardous Materials Release



Source: Local and Tribal Hazard Mitigation Plans, 2023

4.11.4 Summary/Conclusion

The following bullets summarize highlights and conclusions related to HazMat releases.

- North Dakota requires both Tier I and Tier II hazardous material reporting for releases, providing a more accurate representation of substance releases into its environment than national standards. Information is gathered, stored, and analyzed through the NDDES HazConnect software and Hazardous Chemicals Program.
- North Dakota has invested in developing its HazConnect portal for spills which improves its ability to monitor releases, track clean-ups and assign responsibility. HazConnect also allows the state to identify problem locations or activities creating the possibility of improved training, increased monitoring and development of relevant best practices and guidelines.
- Use of the EPA's EJ Screen and other GIS Based Equity mapping software can help local emergency managers identify at-risk populations for specific events in their community and better address needs in the event of a HazMat release.

- Oil and gas facilities are the largest contributor to HazMat release incidents, and a continued unified approach by the state to address safety can help to improve safety. Opportunities exist to enhance training and monitoring in this industry.
- Most water pollution in the state occurs on American Indian land within the Bakken. Opportunities to improve NPDES facilities and efficiencies to respond to incidents should be considered.
- The state has no current contaminated lands listed in the National Priority list that have not been remediated. The growing oil industry may produce future sites, and there is an opportunity to evaluate orphaned wells and abandoned mine lands for future consideration.
- HazMat release incidents are generally increasing over time. HazMat release data continues to be closely tracked, resulting in an increased number of reported incidents, however they range greatly therefore magnitude of this evolution is unclear.
- Oil and gas incidents reported to the state are the most plentiful and have the lowest clearance rates.
- Equipment malfunction and winter weather are top culprits in creating hazmat incidents in oil and gas. Weatherization and more routine equipment checks may reduce these incidents. Additional occupational hazards may occur due to extreme weather conditions putting workers at increased risk.
- Permitted releases are generally decreasing over time, but ammonia and methanol are increasing.
- First responders often face an increased risk of exposure to HazMat releases. Knowing what hazardous substances exist locally and getting local training on how to anticipate and protect from exposure can be critical in reducing harm to this vulnerable population.
- The environment can experience long-term consequences from HazMat releases, including the loss of productivity, biodiversity, and undesirable growth, depending on the hazardous substance.
- Opportunities exist to review existing land laws to create opportunities to fund rehabilitation of contaminated lands. Examples include the State of Michigan's Land Bank law that allows any property that enters a land bank to be considered a brownfield and thus, qualified to receive brownfield funding or create tax increment financing.
- Oil and gas resources and complex jurisdictional oversight issues make the Fort Berthold area more vulnerable to HazMat releases than other areas of the state. Cooperation agreements could be sought that allow for clearer jurisdictional enforcement.
- The elderly and children are more susceptible to the impacts of hazmat releases. Impoverished and minority populations are often disproportionately exposed to hazardous materials.
- Hospitals located near HazMat incidents can leave patients vulnerable and create a significant burden on victims for transportation for treatment. In a rural setting, the areas of vulnerability may be magnified.
- The overlap of oil and gas and agriculture can have adverse impacts on the agricultural sector as pollution of freshwater and land can impact potability and productivity for farmers and ranchers.

- A commitment to safety can help improve worker loyalty in the oil and gas industry, where perceptions of risk can create labor deficits. The state's development of safety programs is a positive step in fostering that commitment, as is its requirement for HazMat reporting beyond the federal minimums.
- Increasing infrastructure in the transportation and disposal of oil and gas products and byproducts can reduce the overall risk to people, property, and infrastructure to HazMat releases.
- Population growth in western North Dakota where oil and its byproducts are more prevalent may put this growing population at increased risk for HazMat release exposure as compared to other North Dakotans.

4.11.5 Data Limitations

While the Community Right to Know Act makes much data about HazMat presence available to the public, commerce law keeps much information related to the oil and gas industry private. As oil and gas represent the primary source of these incidents and releases, a clearer picture of risk is not possible. Data about well production, transportation of crude and byproducts and tank-farm volumes are not available for analysis.

4.12 Geologic Hazards

4.12.1 Overview

Geologic hazards, as defined by the United States Geological Survey (USGS), are earth-related natural phenomena capable of inflicting harm to people or property (USGS Communications and Publishing, 2023).

4.12.1.1 Description

The North Dakota Geologic Survey (NDGS) considers geologic hazards according to their relative probability of impacting the state. This plan follows that approach.

4.12.1.1.1 Geologic Hazards of Common Occurrence

The hazards in this section are common occurrences in the state of North Dakota and the areas where the state scientific and engineering community focuses its efforts and knowledge development to reduce risks to people and property.

4.12.1.1.1.1 Landslides

According to the USGS, a landslide is, "the movement of a mass of rock, debris, or earth down a slope. Landslides are a type of 'mass wasting,' which denotes any down-slope movement of soil and rock under the direct influence of gravity. The term 'landslide' encompasses five modes of slope movement: falls, topples, slides, spreads, and flows. According to the Department of the Interior (2023), these are further subdivided by the type of geologic material (bedrock, debris, or earth). Debris flows (commonly referred to as mudflows or mudslides) and rock falls are examples of common landslide types" (Department of Interior, 2023).

Landslides are rarely created by a single cause. Gravity, slope, weather conditions, runoff patterns, strength of the earthen materials, erosion, changes in groundwater, changes in surface conditions and other geologic hazards can all substantially contribute to the development of a landslide hazard.

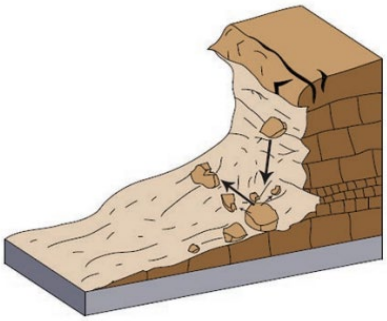
Are there sinkholes in North Dakota?

Headlines such as "Sinkhole emerges near hospital, prompts swift response by Dickinson officials," in The Dickinson Press in June 2023 can indicate a growing threat from sinkholes. However, this term can have different definitions in geology and in common use. Geologically, sinkholes are "depression(s) in the ground that have no natural external drains to the subsurface," and these features are associated with the karst topography natural in Florida and Kentucky, among other areas. In common terms, sinkholes are applied generally to land subsidence features of all types, which is any "gradual settling or sudden sinking of the Earth's surface owing to subsurface movement of earth materials" (Department of the Interior, 2023). Land subsidence, which includes landslides, sinkholes, and failure of the land due to extraction, drainage, or infrastructure damage, likely is a growing threat, especially as new lands are developed, and new infrastructure is built.

The following five modes of landslides impact North Dakota:

- **Falls** are the detachment of rock or soil from a steep slope, sending soil or rock rolling or bouncing along with the force of gravity. This occurs on steep rocky slopes and banks often from weathering, erosion, and/or nearby excavation or ground disturbance. Depending on the size and volume of the material involved, a fall can damage critical infrastructure, shut down roads and railroads, or injure or kill people in the path of the falling material. Erosion of cliff or riverbank slopes also can undermine foundations nearby. **Figure 4.12-1** illustrates the actions of a fall.

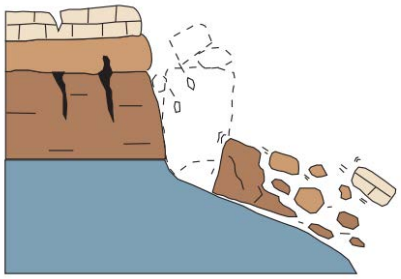
Figure 4.12-1: Illustration of a Fall



Source: Highland and Dobrowsky, USGS, 2008

- **Topples** are a forward rotation of earthen material below the center of gravity of the displaced material. Water or ice weathering or freezing and thawing are a significant contributor to topples, which are particularly prevalent in volcanic soil, like that of western North Dakota. River/Lake bank undercutting, nearby excavation or vibrating, or wind erosion over time can also lead to topples, which can occur quickly or starting as a crack over time. **Figure 4.12-2** illustrates a topple.

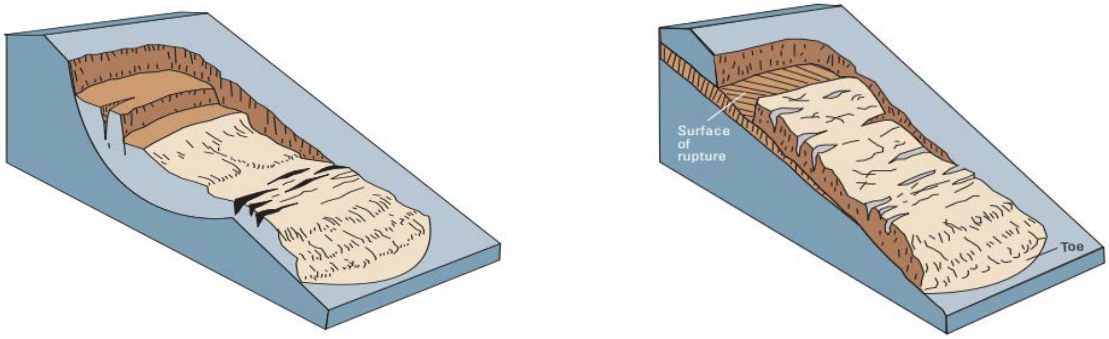
Figure 4.12-2: Illustration of a Topple



Source: Highland and Dobrowsky, USGS, 2008

- **Slides** are downslope movements of rock along a surface or along thin sheer zones. Slides movement typically begin with a small movement that grows in volume over time. Identifying the movement early is critical in mitigating loss. Precipitation or flooding tends to trigger slides. Slides are categorized as either rotational or translational. A rotational slide forms a spoon-like upward curve around an axis, forming a slump tilting backwards toward the original slope. A translational slide is shallower than a rotational slide and creates a more planar consistent and a

Figure 4.12-3: Illustrations of Rotational and Translational Slides

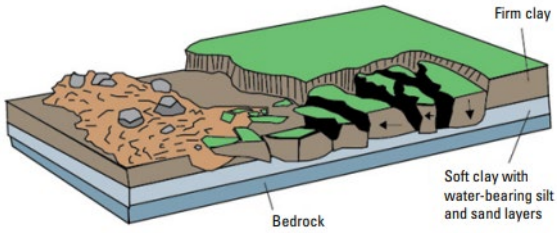


Source: Highland and Dobrowsky, USGS, 2008

slump that has a more consistent surface. **Figure 4.12-3** illustrates both slides (Highland and Dobrowsky, 2008). Rotational slides are the most common type of landslide in the state, particularly in the Little Missouri River Badlands in western North Dakota.

- **Spreads** are an area of general subsidence or fracturing of underlying material leading to block subsidence, liquefaction, or lateral movement of the surface material. Lateral spreads are more typical in flat terrain with soils that are relatively soft under a harder surface, as is typical in the Red River Valley. Precipitation, snowmelt, flooding, riverbank erosion and development can trigger spreads. **Figure 4.12-4** illustrates the deformation of a spread.

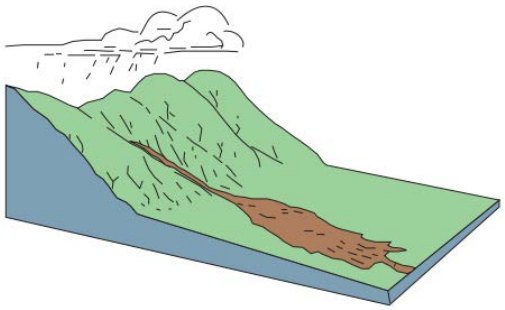
Figure 4.12-4: Illustration of a Spread



Source: Highland and Dobrowsky, USGS, 2008

- **Flows** are spatially continuous shearing that is more liquid in nature than other landslides and occur rapidly. Colloquially, when occurring with a quick onset, these may be referred to as mudslides or debris flows and are generally triggered by snowmelt, flooding or heavy precipitation. A similar slow-onset flow is often referred to as a creep. Land recently burned by wildland fire or otherwise stripped of vegetation is more prone to flows. Additional flows can occur in relation to volcanic eruptions, permafrost, or avalanches, which do not occur in North Dakota, and therefore are not discussed. **Figure 4.12-5** illustrates a flow.

Figure 4.12-5: Illustration of a Flow



Source: Highland and Dobrowsky, USGS, 2008

4.12.1.1.1.2 Abandoned Mine Lands (AML)

AML are defined as “areas adjacent to or affected by abandoned mines. AMLs often contain unmined mineral deposits, mine dumps and tailings that contaminate the surrounding watershed and ecosystem” (Department of the Interior/USGS, 1999). The North Dakota Public Service Commission oversees reclamation and rehabilitation projects related to AML in the state, with funding from federal fees on coal and a dedicated program as part of the Infrastructure Investment and Jobs Act. The U.S. Department of the Interior’s Office of Surface Mining Reclamation and Enforcement takes the federal lead.

4.12.1.1.1.3 Expansive/Unstable Soils

Expansive soils are soils that expand when water is added and shrink when they dry out. This continuous change in soil volume can cause infrastructure and homes built on this soil to move unevenly and crack (North Dakota Geologic Survey, 2023). Expansive soils and their impacts to the developed environment are found across North Dakota. Dominantly these impacts may occur in the urban areas in the eastern

Red River Valley and in portions of south-central and southwestern North Dakota but are not limited to these regions. Expansive soils can be measured using coefficient of linear extensibility (COLE) values. If the soil has a COLE value greater than 0.06, then it can cause structural damage.

4.12.1.1.1.4 Environmental Minerals: Radon

According to the United States Environmental Protection Agency (EPA), Radon is "a naturally occurring radioactive gas that can cause lung cancer. Radon gas is inert, colorless, and odorless. Radon is naturally in the atmosphere in trace amounts. Outdoors, radon disperses rapidly and generally is not a health issue. However, radon is dangerous when trapped indoors after it enters buildings through cracks and other holes in the foundation (EPA, 2022), Radon exposure occurs inside homes, schools, and workplaces. Radon decays into radioactive particles that can be trapped in the lungs when inhaled. These particles release small bursts of energy that damage lung tissue and may lead to lung cancer (Utah Geological Survey, 2023).

Radon affects the entire state but notably may be more prevalent in the Red River Valley. Radon levels are measured through short- and long-term radon testing.

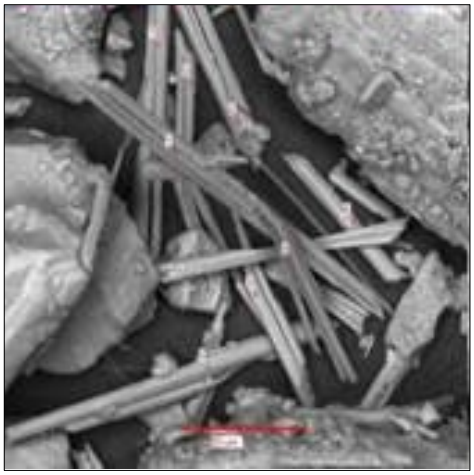
4.12.1.1.2 Geologic Hazards of Limited Occurrence

The following hazards have occurred in North Dakota but either have a limited geographic range or limited impacts in the state.

4.12.1.1.2.1 Environmental Minerals: Erionite, Uranium, Arsenic

According to the North Dakota Department of Environmental Quality (2023), erionite is "a naturally occurring, microscopic, fibrous mineral," that derives from volcanic ash, has similar qualities to asbestos and is found in at least 12 states, including North Dakota.

Figure 4.12-6: Erionite Crystals



Source: NDDEQ, 2023

According to the EPA (2023), Uranium is naturally occurring in the physical environment and is a by-product of the decay process of rock. Uranium decays into radium, which releases radon. Both produce radiation and can contribute to cancer development.

Arsenic is a natural chemical element in the Earth's crust, according to the National Institute of Environmental Health Sciences (NIEHS). While widespread, it varies locally, and becomes problematic at high exposures in food, pollution and/or drinking water. According to NIEHS (2022), arsenic is more prevalent in drinking water from groundwater sources, such as wells, which rural North Dakotans rely heavily upon.

4.12.1.1.2.2 Earthquake

The USGS defines an earthquake as "the ground shaking caused by a sudden slip on a (tectonic) fault." What humans experience is the shaking from the "release of energy in wave form that travels through the Earth's surface, when the stress on the plates overcomes the friction" (USGS, 2023). **Figure 4.12-7** shows a description of the Modified Mercalli Scale, which is used to describe the magnitude of an

earthquake. Anything above a 7.0 is considered a major earthquake. According to the USGS (2023), anything below a 3.0 is considered minor and unlikely to be observed by many people.

Figure 4.12-7: Modified Mercalli Scale

CIIM Intensity	People's Reaction	Furnishings	Built Environment	Natural Environment
I	Not felt			Changes in level and clarity of well water are occasionally associated with great earthquakes at distances beyond which the earthquakes felt by people.
II	Felt by a few.	Delicately suspended objects may swing.		
III	Felt by several; vibration like passing of truck.	Hanging objects may swing appreciably.		
IV	Felt by many; sensation like heavy body striking building.	Dishes rattle.	Walls creak; window rattle.	
V	Felt by nearly all; frightens a few.	Pictures swing out of place; small objects move; a few objects fall from shelves within the community.	A few instances of cracked plaster and cracked windows with the community.	Trees and bushes shaken noticeably.
VI	Frightens many; people move unsteadily.	Many objects fall from shelves.	A few instances of fallen plaster, broken windows, and damaged chimneys within the community.	Some fall of tree limbs and tops, isolated rockfalls and landslides, and isolated liquefaction.
VII	Frightens most; some lose balance.	Heavy furniture overturned.	Damage negligible in buildings of good design and construction, but considerable in some poorly built or badly designed structures; weak chimneys broken at roof line, fall of unbraced parapets.	Tree damage, rockfalls, landslides, and liquefaction are more severe and widespread wiht increasing intensity.
VIII	Many find it difficult to stand.	Very heavy furniture moves conspicuously.	Damage slight in buildings designed to be earthquake resistant, but severe in some poorly built structures. Widespread fall of chimneys and monuments.	
IX	Some forcibly thrown to the ground.		Damage considerable in some buildings designed to be earthquake resistant; buildings shift off foundations if not bolted to them.	
X			Most ordinary masonry structures collapse; damage moderate to severe in many buildings designed to be earthquake resistant.	

Source: USGS, 2023

4.12.1.1.3 Geologic Hazards with a Remote Probability of Occurrence

This section discusses geologic hazards with an extremely low probability to occur in North Dakota, but if they were to occur in the state, they could have consequences to people and property.

4.12.1.1.3.1 Meteorite Falls

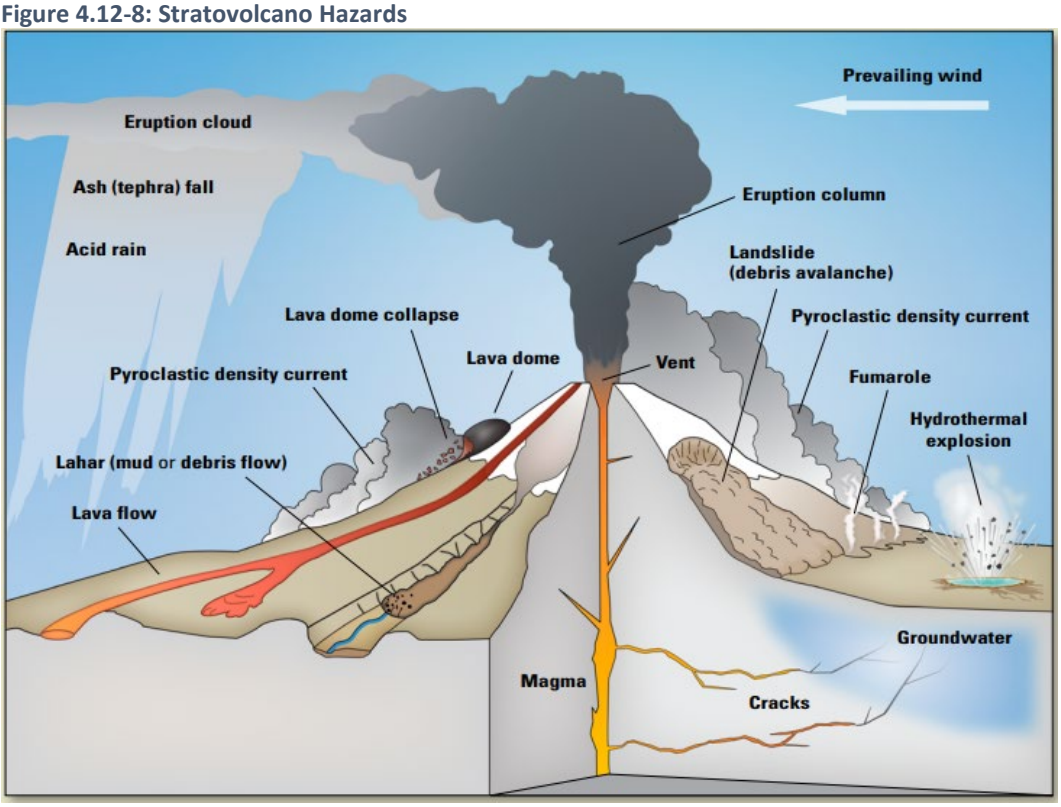
The National Aeronautics and Space Administration (NASA) defines a meteorite as a "solid piece of debris from an object, such as a comet, asteroid, or meteoroid, that originates in outer space and survives its passage through the atmosphere to reach the surface of a planet or moon" (NASA, 2023). There have been 11 reported meteorites in North Dakota, with the 1918 Richardton meteorite and the New Leipzig meteorite in 1936 being the most notable. Pieces of each can be viewed at the State Heritage Center in Bismarck, ND. The Richardton meteorite is considered to be a stony meteorite, which caused an explosion as it shattered while entering the atmosphere. According to Murphy (2006) and the North Dakota Historical Society (2023), the New Leipzig meteorite was a 44-pound iron meteorite that was encountered, there is no specific day in 1936 as to when it arrived in North Dakota.

The 1918 Richardton meteorite, a 200-pound mass, is North Dakota's largest and most famous space rock. Others include quarter pound (Grand Forks), and nine-pound (Jamestown) space rocks that were found in the 19th Century. Freda, New Leipzig, Bowesmont, Williston, Glasston, and Drayton had 20th Century discoveries. More recently in 1999, an 84-pound meteorite was unearthed near Colgate in Steele County. According to the State Historical Society of North Dakota (2023), there are also two significant craters that have been discovered in Renville and McKenzie County in the 1970s.

4.12.1.1.3.2 Volcanic Hazards

Although an eruption is highly unlikely, the Yellowstone Volcano in western Montana is a stratovolcano, and when it next erupts, it is possible that North Dakota could experience impacts from a massive volcanic event. **Figure 4.12-8** shows the features and hazards associated with a stratovolcano.

Figure 4.12-8: Stratovolcano Hazards



Source: Stovall, Driedger, Westby, and Faust; USGS, 2019

A stratovolcano is a "tall, cone-shaped and often glaciated volcano that erupts explosively," according to the USGS (Stovall, Driedger, Westby, and Faust, 2019). They describe the hazards that follow the eruption, as such:

> "Eruptions can proceed in the following sequence, but these events may occur independently. Magma (underground molten rock) rises from deep below the volcano, and (1) explosive eruptions blast volcanic debris (tephra) into the sky, forming an eruption column and cloud. (2) The ash cloud cools and drifts downwind, and ash falls to the ground at local air temperature. (3) Lava flows move downslope or form lava domes at the erupting vent. (4) Eruption columns, lava flows, or lava domes collapse, creating hot pyroclastic density currents.

(5) These can melt snow and ice or enter rivers to create lahars. Even when a volcano is not erupting, landslides or debris avalanches can occur due to gravity. At stratovolcanoes and caldera systems that host hot springs, fumaroles, and other thermal features, hot rock and steam blasts called hydrothermal explosions can occur at any time."

4.12.1.2 Previous Occurrences

- According to the USGS (2023), the Yellowstone volcano erupted 70,000 years ago, covering North Dakota in sharp volcanic ash, but there are no geological indicators that Yellowstone will experience another eruption for at least several thousand years.

- On March 27, 1980, a series of volcanic explosions began at Mount St. Helens in Skamania County, Washington. A strong, vertically directed explosion of ash and steam began shortly after the initial blast and rose very quickly. According to the USGS (2023), more eruptions occurred in the following months, and by May 18, 1980, the ash cloud spread to the central United States, including North Dakota. The ash was particularly noticeable in the western half of the state.

- In 1993, 1997, 2000 and 2001, at least 12 homes have been lost due to landslides in Valley City, according to the North Dakota Enhanced State Hazard Mitigation Plan (2019).

- On March 25, 2010, according to the North Dakota Enhanced State Hazard Mitigation Plan (2019), a landslide south of Washburn in McLean County caused a train to be derailed, killing one railroad worker, and injuring another.

- North Dakota's last earthquake occurred in September 2012 near Williston. The 3.3 magnitude quake went predominantly unnoticed by residents. According to the USGS (2023) and the Geologic Hazards Committee (2023), while there is increased oil and natural gas in the state, there is a minimal risk of induced seismicity from this because ND extraction methods occur much higher in the stratigraphic column than in other extraction areas in the United States.

- Landslides along Highway 22 near Killdeer have shut down the main thoroughfare in the region in 2012, 2011, 2022 and 2023. Detours have added approximately 50 miles to a trip.

- Slides along River Road in Bismarck have closed the route in 2019, 2020 and 2022. According to Donovan (2023), Highway 85 in western North Dakota also has troubles with chronic landslides.

- Built on a river bluff, the University of Mary received over $3 million in Federal Emergency Management Agency (FEMA) grants in 2021 to help mitigate the threats posed from landslides, and a second landslide mitigation grant, to build retaining walls to secure campus buildings from risk of collapse. According to FEMA (2021), a similar project is expected in the future.

Most geologic events in North Dakota that occur in undeveloped lands go unreported and cause little damage.

4.12.1.3 Location and Extent

4.12.1.3.1 Landslides

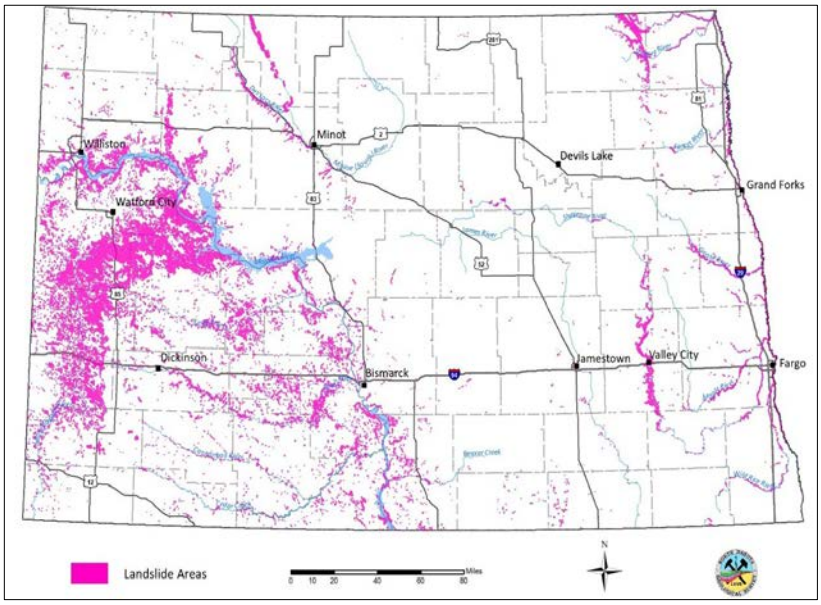
Landslides occur across North Dakota and are concentrated along glacial meltwater and recent hydrologic corridors in central and eastern North Dakota and throughout the rugged topography of southwestern North Dakota and the Little Missouri Badlands. Landslides occur in a wide variety of rocks and sediments including sedimentary bedrock found across western and southwestern North Dakota and glacial sediments along hydrologic corridors in central and eastern North Dakota. Ground subsidence may also be found throughout western North Dakota where historical underground coal mining was done.

Figure 4.12-9: Highway 22 slumping, near Killdeer

Source: NDDOT, Maike, NDGS, 2023

Due to the risk of damage to private property and critical infrastructure, North Dakota has invested heavily in knowledge development around landslides since the last plan. As of 2023, using Light Detection and Ranging (LiDAR) imagery, North Dakota has mapped the state at the detailed scale of 1:24,000 to determine where land continues to move.

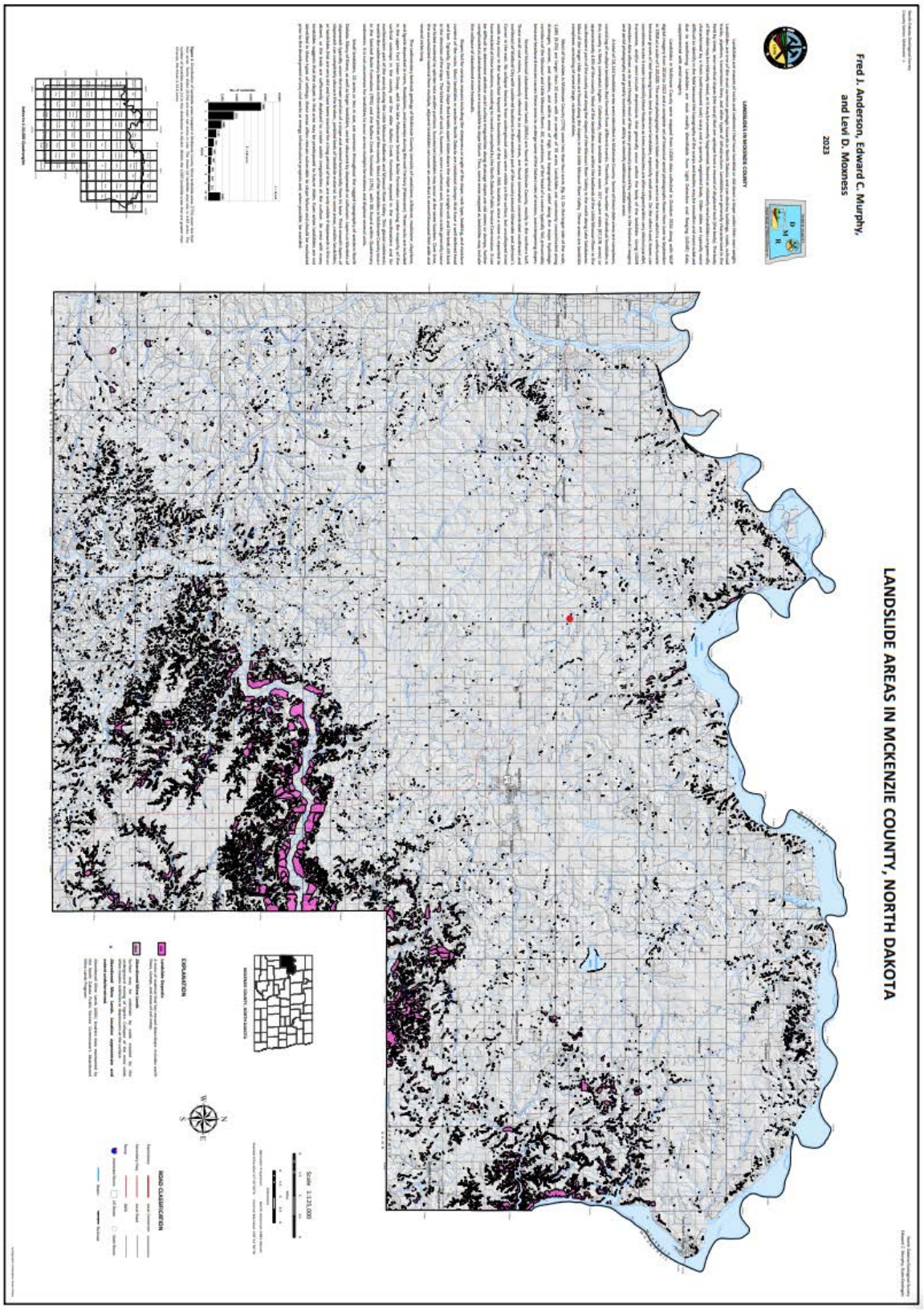
Figure 4.12-10: Areas of Landslides in North Dakota



Source: NDGIS, 2023

The state is scaling the data to develop this information base at a county level, which would help identify areas that are unsuitable for development or where the next big landslide may occur (Maike, 2023). While not all counties are available at the time of publication, the state prioritized areas that are most subject to landslides. **Figure 4.12-10** shows a state-level map of this data and **Figure 4.12-11** shows McKenzie County's more detailed map (NDGS, 2023). These maps indicate that the areas of the Little Missouri Badlands in western North Dakota and the riverbanks of North Dakota rivers in eastern North Dakota are most prone to landslides.

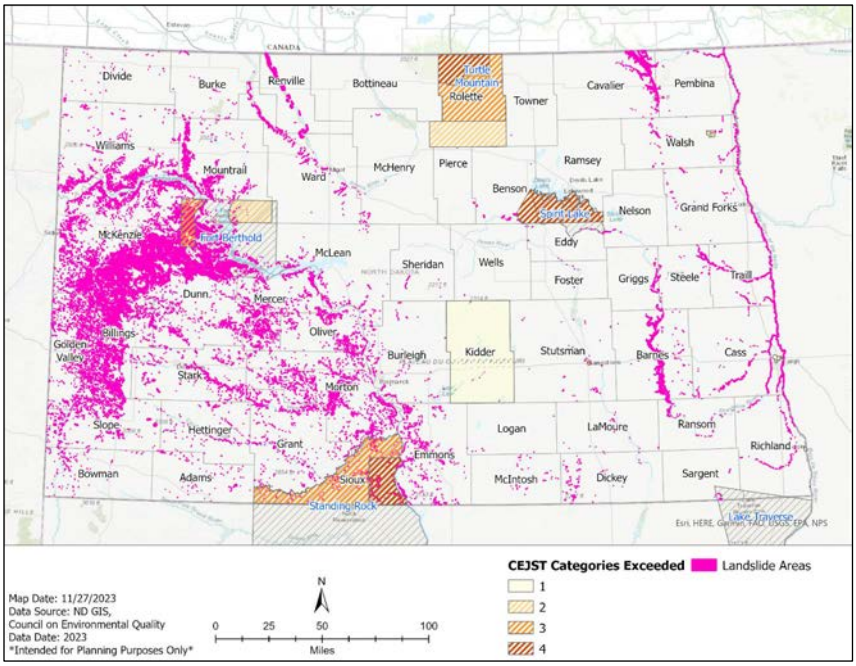
Figure 4.12-11: Areas of Landslides in McKenzie County, 2023



Source: NDGS, 2023

Figure 4.12-12 displays landslides in North Dakota overlaid with census tracts from the US Council on Environmental Quality's Climate and Economic Justice Screening Tool (CEJST). CEJST data identifies communities as disadvantaged by scoring them in the categories of climate change, energy, health, housing, legacy pollution transportation, water and wastewater, and workforce development. As shown on the map, two disadvantaged communities in McKenzie and Sioux Counties are located in areas of high landslide concentration.

Figure 4.12-12: Areas of Landslides and CEJST Communities



Source: CEQ, 2023; NDGIS, 2023

4.12.1.3.2 Abandoned Mine Lands (AML)

Abandoned Land Mines are primarily a problem west and south of the Missouri River. Morton County has the most AML by far, with 204 entries into the registry, as shown in Figure 4.12-13. The 1,743 AML identified by the North Dakota Public Service Commission as of 2022 were primarily located in Adams, Billings, Bowman, Burke, Burleigh, Divide, Dunn, Emmons, Golden Valley, Grant, Hettinger, McHenry, McKenzie, McLean, Morton, Mountrail, Oliver, Renville, Slope, Stark, Ward and Williams counties.

There are a few instances east of the Missouri River, including the Griswold Gold Mine in Ransom County, a coal mine in Sheridan County and two unidentified mines in Rolette County. Surface mines (929) are the majority of AML, with 477 underground mines being second. According to North Dakota Public Service Commission (2022), disincentives for coal may contribute to AML in the Missouri Valle, as shown in **Figure 4.12-14,** below.

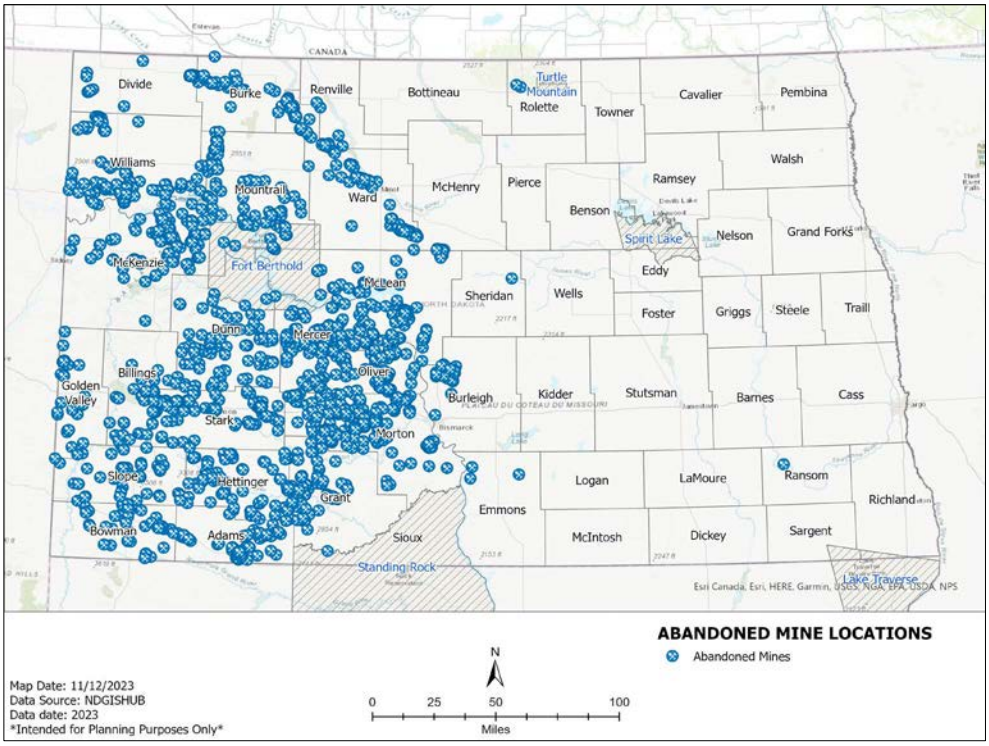
Figure 4.12-13: Top AML Counties, 2023

County	AML
Morton	204
Williams	144
Ward	132
Mercer	126
Stark	121
McKenzie	112
McLean	104
Hettinger	98
Mountrail	93
Dunn	91
Grant	87
Oliver	83
Adams	71
Bowman	50
Slope	49
Burleigh	34
Golden Valley	34
Billings	30
Burke	30
Divide	24
Renville	15
Others	11
Total	1743

Source: NDPSC, 2023

> Between 1990 and 2019 the PSC [Public Service Commission] has reclaimed all or parts of twelve surface mines in Morton County. This work eliminated approximately 17,000 feet of dangerous highwalls. The PSC anticipates future surface mine reclamation projects in Morton County.
>
> *(Morton County Multi-Jurisdictional Hazard Mitigation Plan, 2020)*

Figure 4.12-14: Abandoned Mine Lands in North Dakota, 2022

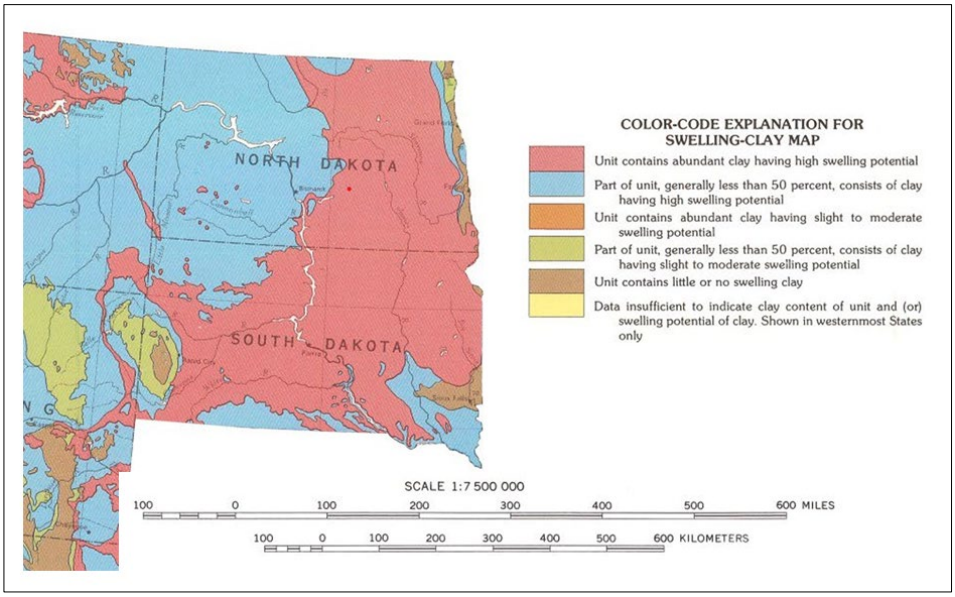


Source: ND GIS, 2023

4.12.1.3.3 Expansive/Unstable Soils

The Drift Prairie region of the state includes soil with substantial clay content that is prone to expansion and shrinkage based on moisture content (Anderson, 2004; NDPSC, 2023), as shown in **Figure 4.12-15**. Much of this area was a former glacial lakebed. Excessively dry or wet conditions will cause the physical space that the soil takes up to expand and contract, potentially damaging hard surfaces it comes in contact with (Amakye, et al. (2021). This can cause buckling and cracks in cement foundations, roadways, and sidewalks.

Figure 4.12-15: Expansive Soils in the Northern Great Plains



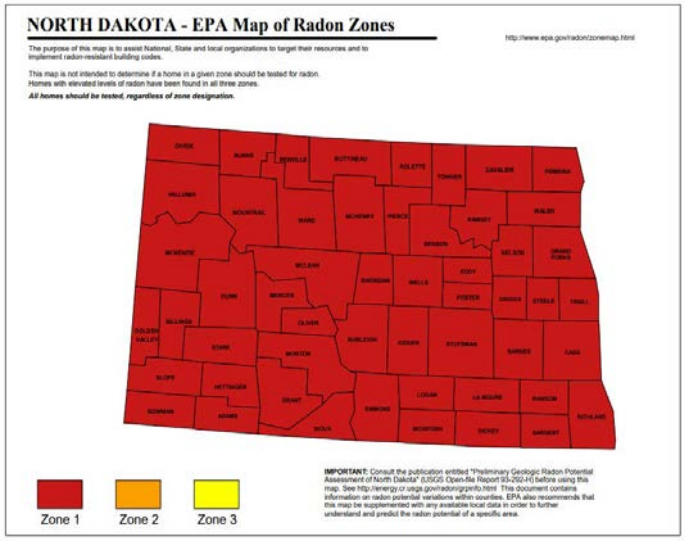
Source: Adapted from USGS IMAP 1940, Olive et al., 1989,

4.12.1.3.4 Environmental Minerals: Radon

Radon is prevalent across the state, with the entire state falling into the EPA Zone 1, where testing is recommended for all homes, as shown in **Figure 4.12-16**. According to the EPA (2023), radon cannot be seen or smelled, but is a radioactive carcinogen known to cause lung cancer.

> According to the N.D. Dept. of Environmental Quality, between January 1, 2014, and March 1, 2021, there were approximately 43 positive tests for radon in residential homes in Foster County.
>
> *(Foster County Multi-Jurisdictional Hazard Mitigation Plan, 2021)*

Figure 4.12-16: North Dakota Radon Zones



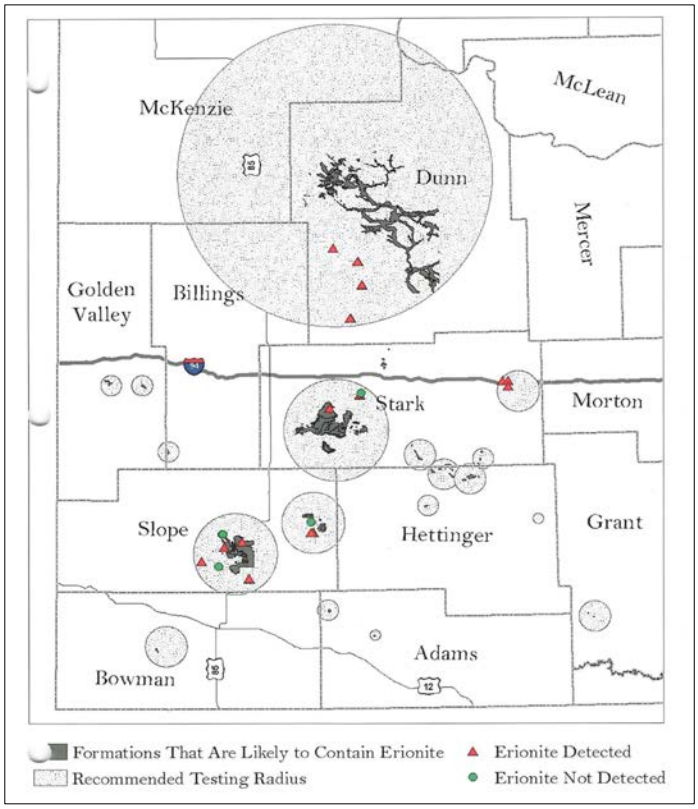
Source: EPA, 2023

4.12.1.3.5 Environmental Minerals Erionite, Uranium, and Arsenic

Erionite is present near the Kildeer Mountains, Chalky Buttes and Little Badlands area in western North Dakota where there is some volcanic ash mixed in the soil. Specific areas are identified in **Figure 4.12-17**. It may also be present in other areas where there are high buttes. In 2006, further risk was spread when gravel from the area was excavated before the risk was known and used in local roads and parking lots and play yards in western North Dakota.

Although erionite may be present in the gravel, tests were conducted in the early 2000s that indicated general exposure would be unlikely to cause negative health impacts. According to the North Dakota Department of Environmental Quality (2023), occupational exposure to road maintenance and gravel pit workers can lead to lung damage, and such workers are suggested to take precautionary measures, including masking.

Figure 4.12-17: Known and Suspected Erionite Areas



Source: North Dakota Department of Environmental Quality, 2023

There is an estimated 480,000 pounds of mineable uranium in North Dakota, found in Bowman, Slope, Stark, Billings and Golden Valley Counties, as shown in **Figure 4.12-18**. While it may be a valuable commodity, it is also a health hazard.

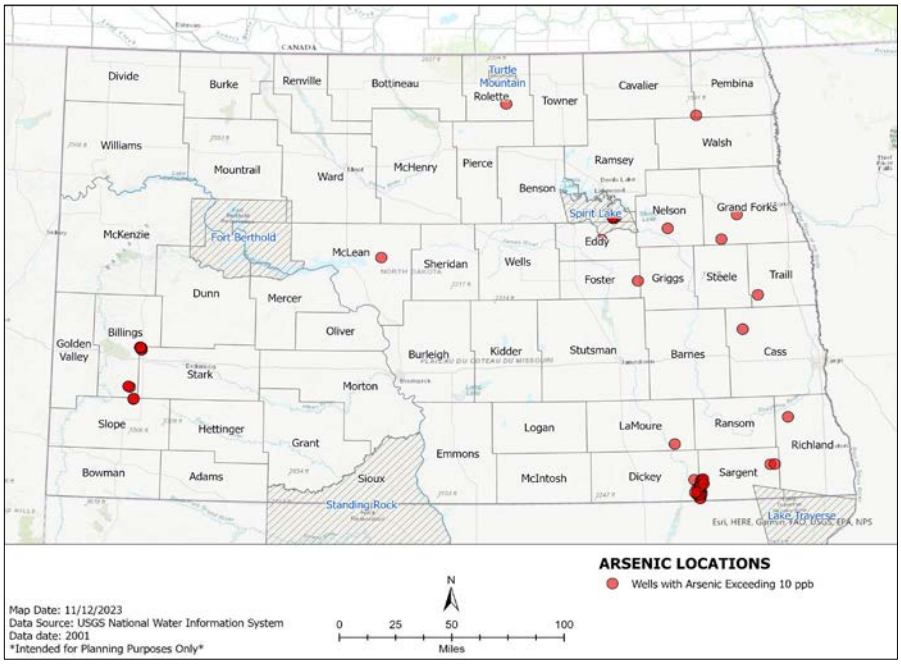
Uranium is radioactive and found in coal in the area. It was mined in the 1960s before transportation concerns and nuclear accidents disincentivized the commodity. Abandoned surface mines, areas of shallow deposits and radioactive dust from kilns used to process the material remain in the environment from this brief uranium boom. According to the North Dakota Geologic Survey (2023), radon's impact on groundwater and pastures and increased levels of radon in these areas will persist as concerns into the future. Reclamation occurred for all known abandoned mines, but due to the brevity of the industry, lack of oversight, and national security concerns, record-keeping of all uranium mines is far from comprehensive and exposure in these areas is possible.

Figure 4.12-18: Known Areas of Uranium Occurrence within 200 feet of the Surface

Source: EPA, 2023; NDGS, 2023

Groundwater with unsafe arsenic levels is a concern for rural well-water users. Federal standards require water to be treated to keep arsenic at safe levels (<10ppb) in municipal water systems, but well water is not regulated. Water testing is the responsibility of the well owner and can be conducted by a state-certified lab for a cost of about $40. If arsenic is found, water treatment products can be installed either for all water entering the house or at the faucet level (North Dakota Department of Environmental Quality, 2019). **Figure 4.12-19** shows areas where testing has led to a determination of unsafe arsenic levels.

Figure 4.12-19: Arsenic Levels Exceeding 10 ppb from Laboratory Tests

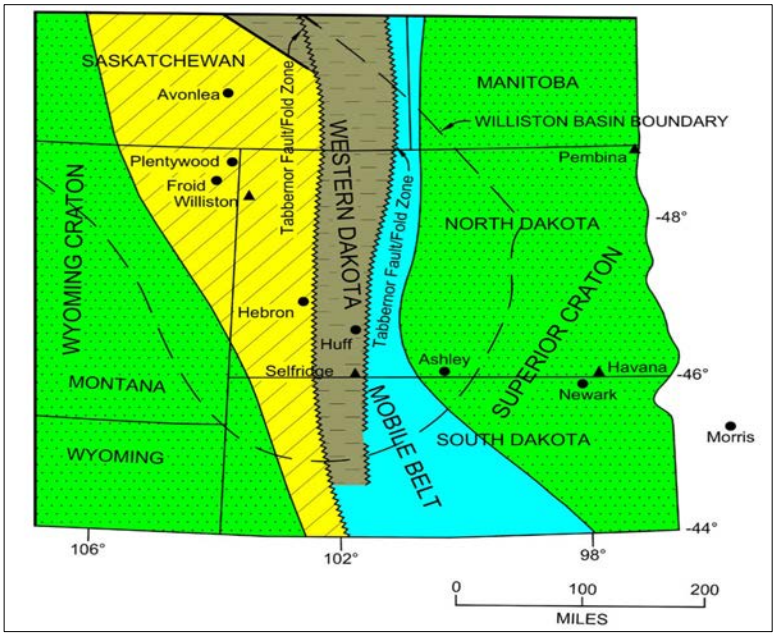


Source: USGS, 2001

4.12.1.3.6 Earthquake

Due to the presence of the Tabbernor Fault/Fold Zone, shown in **Figure 4.12-20**, there is a risk of earthquakes in the state, and while there is a history of earthquakes, there is no history of large earthquakes with substantial impacts on the public or property.

Figure 4.12-20: Tectonic features in the state and the region



Source: Bluemle, NDGS, 2007

Figure 4.12-21 indicates the locations and magnitude of past North Dakota earthquakes, according to the USGS. The earthquakes have occurred in or near the identified fault/fold zone. Before records were kept there were a few earthquakes in the Red River Valley in the 19th Century. Similar mild impacts from earthquakes in regions neighboring the state can be observed. Any earthquake with a magnitude rating over a 7.0 is considered a major earthquake, and one such earthquake occurred in the Yellowstone areas of Montana in 1905 that was felt in North Dakota, but there are no damage reports from the time and damages were expected to be minor.

Figure 4.12-21: Earthquakes Felt in North Dakota

Table 1. Summary of earthquakes that have been reported to have occurred in North Dakota.

Day	Date	Time (local)	Magnitude	Depth (mi.)	Modified Mercalli Intensity	Longitude	Latitude	City or Vicinity of Earthquake
Friday	September 28, 2012	05:53:43	3.3	0.4*	III	-103.48	48.01	SE of Williston
Monday	June 14, 2010	02:58:03	1.4	3.1	I	-103.96	46.03	Boxelder Creek
Sunday	March 21, 2010	11:56:40	2.5	3.1	II	-103.98	47.98	Buford
Sunday	August 30, 2009	20:24:23	1.9	3.1	I	-102.38	47.63	Ft. Berthold SW
Saturday	January 3, 2009	07:53:48	1.5	8.3	I	-103.95	48.36	Grenora
Saturday	November 15, 2008	10:21:27	2.6	11.2	II	-100.04	47.46	Goodrich
Wednesday	November 11, 1998	06:59:37	3.5	3.1	IV	-104.03	48.55	Grenora
Tuesday	March 9, 1982	07:10:50	3.3	11.2	III	-104.03	48.51	Grenora
Monday	July 8, 1968	10:50:12	4.4	20.5	IV	-100.74	46.59	Huff
Tuesday	May 13, 1947	00:02:--	3.7e	U	IV	-100.90	46.00	Selfridge
Sunday	October 26, 1946	15:37:--	3.7e	U	IV	-103.70	48.20	Williston
Friday	April 29, 1927	20:15:--	3.2e	U	III	-102.10	46.90	Hebron
Sunday	August 8, 1915	09:15:--	3.7e	U	IV	-103.60	48.20	Williston

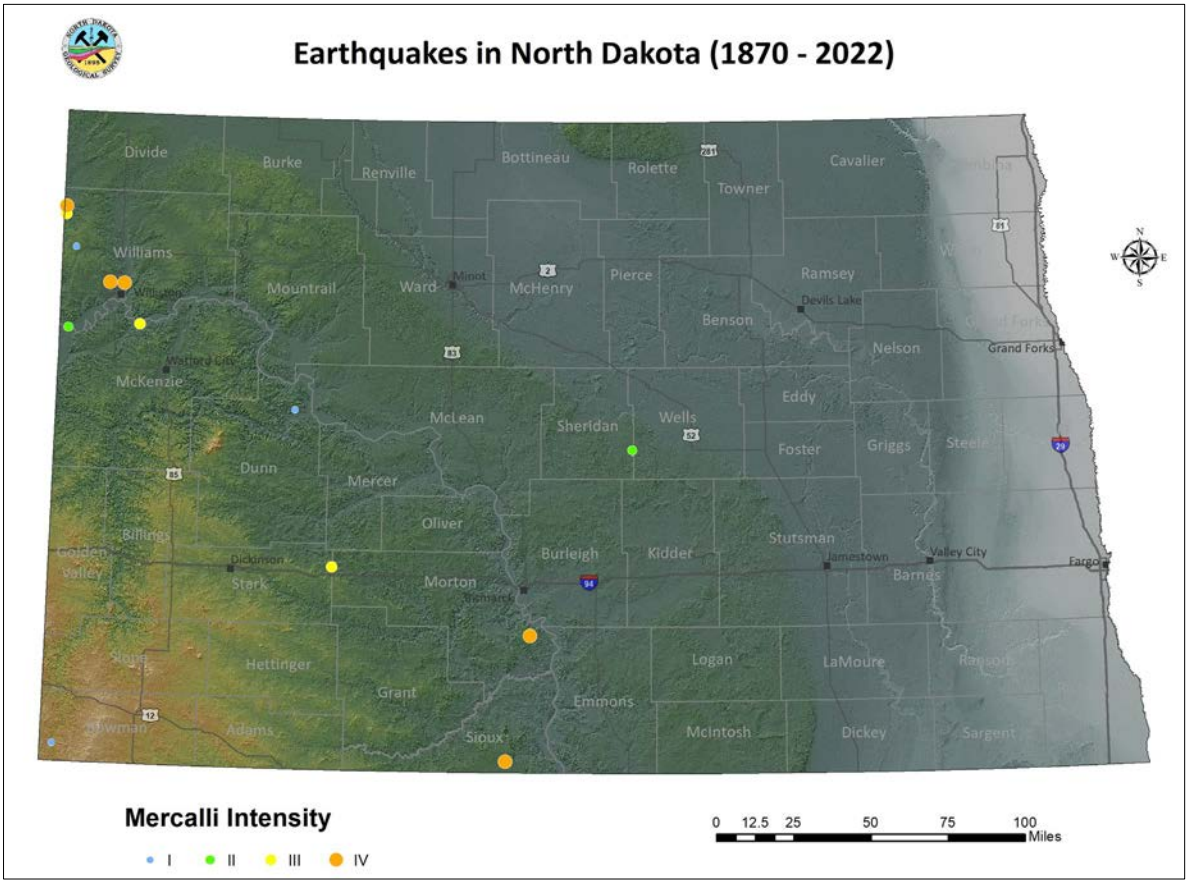
e = magnitude estimated from reported Modified Mercalli Intensity value.

*estimated depth.

Source: Anderson, 2016; NDGIS, 2023

According to the NDGS (Anderson, 2016), all earthquakes felt in the state are shown on the map in **Figure 4.12-22.**

Figure 4.12-22: Locations of Past North Dakota Earthquakes



Source: Anderson, 2016; NDGIS, 2023

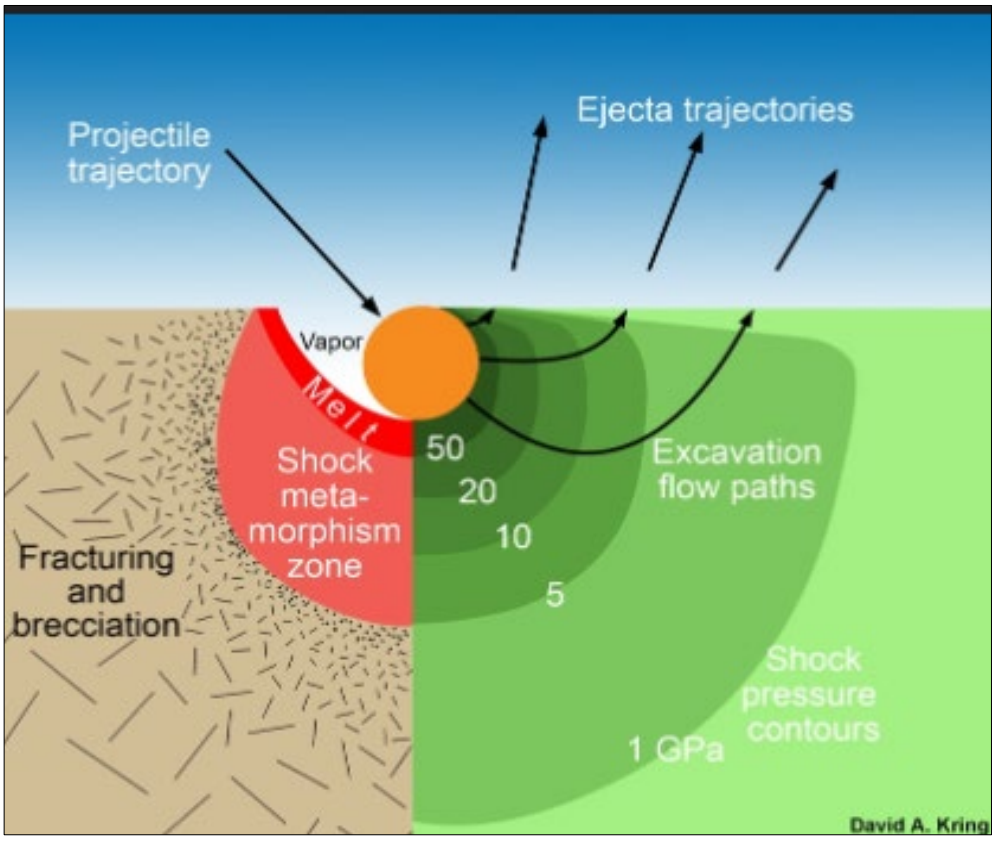
4.12.1.3.7 Meteorite Falls

While **Figure 4.12-23** shows the locations of found meteorites and known impact craters in the state, there is no reason why one location in the state would be more likely to experience a meteorite fall than another. According to the North Dakota State Historical Society (2023), there is a higher likelihood of a meteorite being encountered where people are there to see it, but there is no geological or atmospheric reason why a meteorite lands where it does. The strength of a meteorite can be measured by examining the impact crater, as shown in **Figure 4.12-24**.

Figure 4.12-23: Meteorites and Craters in North Dakota

Source: The Meteoritical Society, 2023

Figure 4.12-24: Pressure Field and Flow of Materials in the Excavation of an Impact Crater

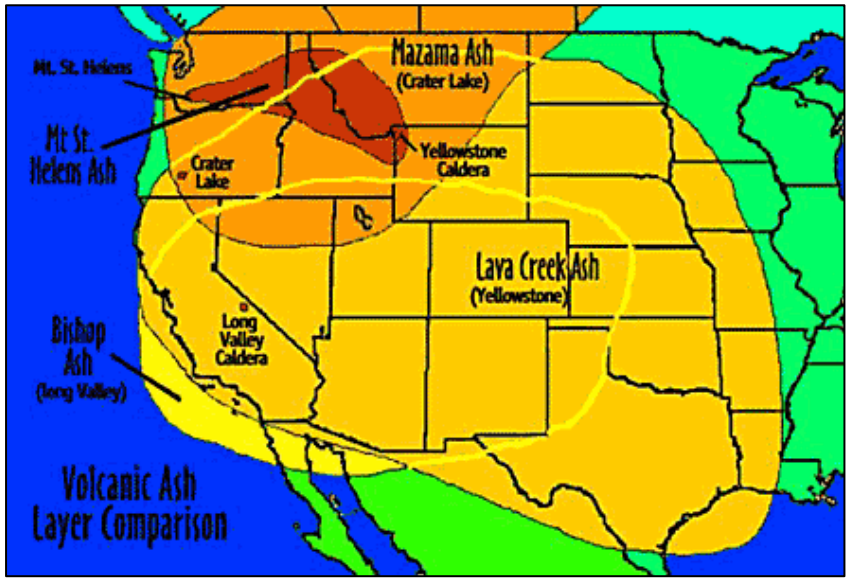


Source: Kring, NASA, 2006

4.12.1.3.8 Volcanic Hazards

There are no active volcanoes in the state of North Dakota, but the Yellowstone volcano is in the western side of neighboring Montana. According to the National Park Service (2023), an eruption is not expected in the next 75 to 100 years, but geologic history indicates that in the unlikely event of a Yellowstone eruption, depending on a variety of geologic and atmospheric conditions, that North Dakota, especially the western side of the state, could experience ash fall from the event, as shown from the map of historic ash falls in **Figure 4.12-25**.

Figure 4.12-25: Previous Yellowstone Eruption Ash Layers



Source: National Park Service, 2023

Figure 4.12-26 is a summary of the overview of the spatial extent of geologic hazards. While geologic hazards are a threat across the state, their impact is generally limited.

Figure 4.12-26 Spatial Extent for Geologic Hazards

Resource	Extent
Public	Statewide
First Responders	Statewide, but unlikely
Delivery of Service and Continuity of Operations	Statewide, but limited
Property, Facilities, and Infrastructure	Statewide
Environment	Limited
State Economy	Statewide, but limited
Public Confidence in the State's Governance	None

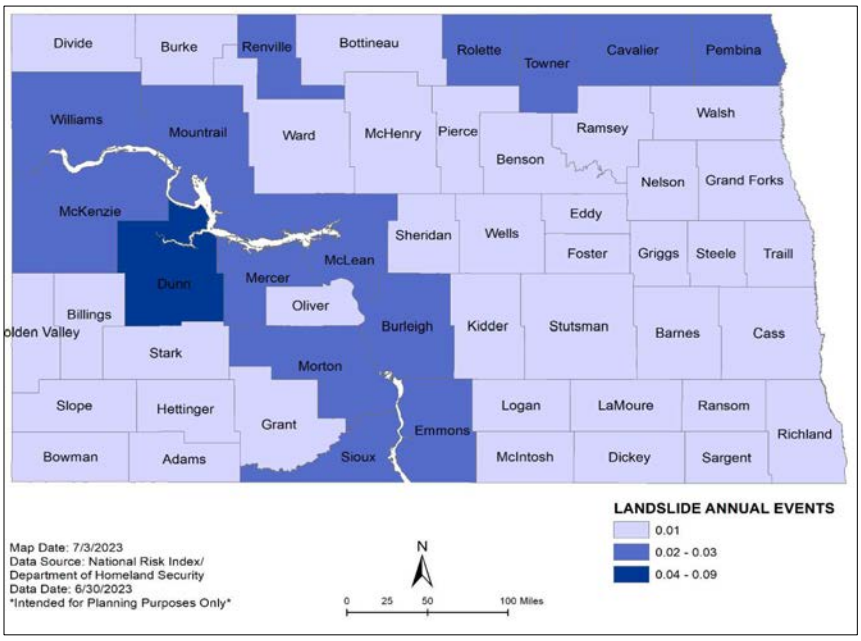
4.12.1.4 Probability

The next section briefly discusses the likelihood of geologic hazards. The state organizes geologic hazards according to their probability of occurring in the state.

4.12.1.4.1 Geologic Hazards of Common Occurrence

Landslides occur constantly in the state, but much of the state that is prone to landslides are lightly populated pastureland or recreational land. Most landslides in North Dakota have consequences that are limited to the landowner or no consequence at all. The probability of a landslide of consequence is and will continue to be minimal. People travelling in cars and along highways in landslide-prone areas, or damage done to infrastructure in these areas are most at risk. **Figure 4.12-27** shows the annual landslide events according to FEMA's National Risk Index (NRI). According to the NRI (2023), the numbers of events range from 0.01 to 0.09 annually. Events with no consequence would not be included in this data.

Figure 4.12-27: National Risk Index Landslide Annual Events



Source: NRI, 2023

While most landslides are going to continue to have no consequence, as western North Dakota becomes more populous and developed, the interaction between people, property and landslides increases the likelihood of a consequential landslide. As jobs and population expand, the cost of road closures and detours increases as well. The probability of a landslide of significant consequence is greater than it was at the last plan, and the impact is marginally greater.

AMLs, while not a problem in every county in the state, will continue to be a problem where they are present. While fluctuations, policy and efficiencies in the coal, natural gas and crude oil markets may continue to increase abandoned mines, greater regulatory policy today means that newly abandoned mines are better marked and protected than legacy mines that may go back more than a century. Earmarked funds exist for rehabilitation of AMLs and thus the state rehabilitates mine lands regularly, prioritizing by risk to the public. The probability of AML creating a health or safety risk is likely the same or marginally less probable than it was five years ago.

The probability of unstable soil damage is likely marginally lower than it was five years ago. The areas where there are unstable soils correspond with areas experiencing population loss except in urbanized areas, where soil testing and fill are more likely to be required by municipal planning regulations and building codes. These areas are seeing new construction to accommodate growth, which will follow updated building practices such as pile foundations and better materials that will be more likely to minimize damage from expanding soils.

Radon continues to be a persistent threat to North Dakotans, and as housing ages, the cracks and deterioration that allows radon to enter the home will increase. Therefore, in areas with aging housing

stock, radon consequences are likely more probable than they were five years ago. New construction is less likely to expose individuals to radon.

4.12.1.4.2 Geologic Hazards of Limited Occurrence

Erionite, uranium and arsenic are minerals that have limited geographic ranges. Erionite exists in areas that are unsuitable for development thus the risk to the public from environmental exposure remains negligible. It is still a health hazard limited to occupational exposure, but its probability is unchanged.

Uranium may have a slight increase in probability of causing a health hazard to the public due to the lack of documentation about the location of unidentified abandoned uranium mines combined with the increase in oil and housing development in the western half of the state. However, the probability of harm is still very low and limited to small geographic areas.

Arsenic is another hazard that may have a limited geography, but the location of the risk is not as well-known as the other minerals in this section and the geography is broader. As North Dakota is both growing in population and becoming more urban, the number of people who rely on well water instead of treated municipal water is lower. In 2020, it was estimated that 18,249 households, or 46,353 North Dakotans rely on well water in their household (Water Systems Council, 2020). Until 1990, the source of home water was a question in the Census. In 1990, 52,953 relied on well water, according to the US Census Bureau (1990). This is a decrease of 5.1 percent of households, from 19.2 percent in 1990 to 14.1 percent in 2020, potentially exposed to arsenic or other toxins in well water.

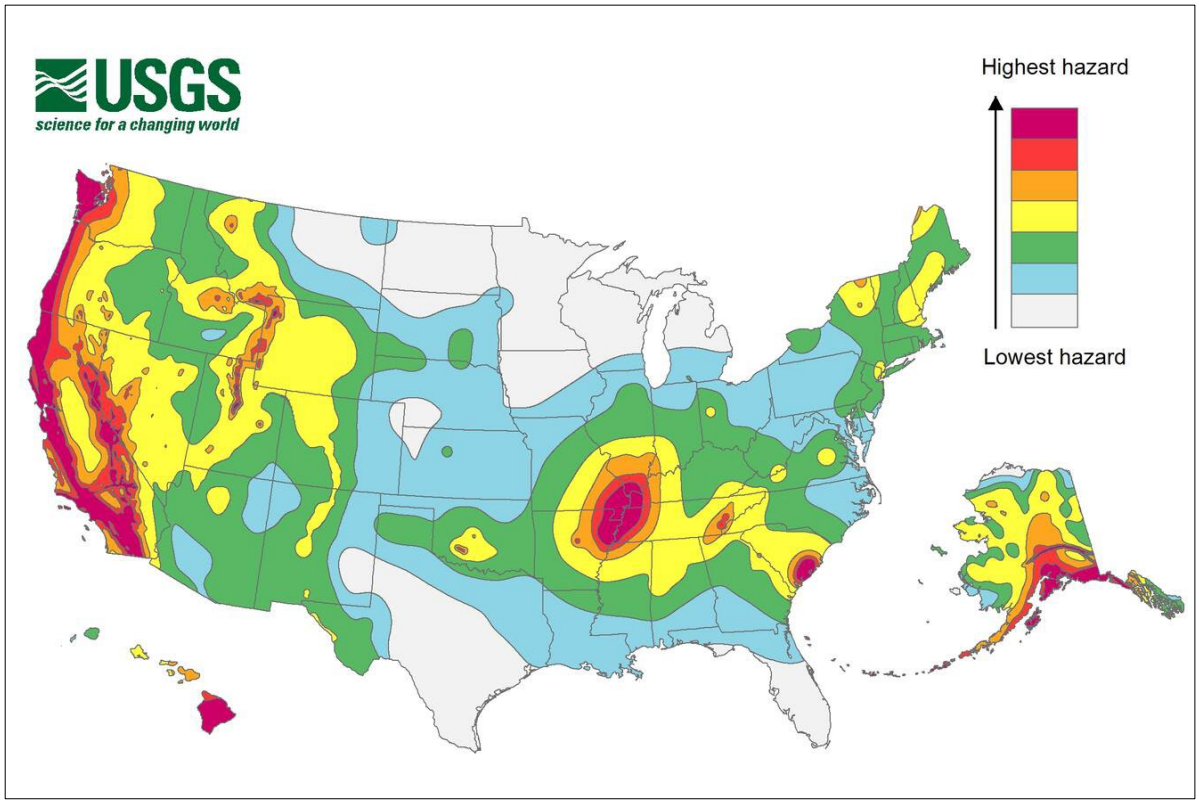
Figure 4.12-28: Arsenic in Drinking Water

Source: Shea, 2011

The low cost and pervasiveness of house or faucet water-filtration products has also grown over time. According to Fortune Business Insights, the water purifier market in the United States was $38.7 billion in 2022, with a projected 10.5 percent growth rate over the next 10 years with the residential sector being the largest growth sector, primarily due to awareness about the risk of chemicals in water (Fortune Business Insights, 2022). This adoption of technology reduces the probability that arsenic presence will lead to a hazard consequence.

Based on the aggregated data from Figure 4.12-22, there have been 13 earthquakes felt in North Dakota, primarily in the western half of the state, since records began in 1870. On average, a minor earthquake occurs in North Dakota around once every 10 years. **Figure 4.12-29** shows the nationalized risk for earthquakes felt. This map was recently updated and reduces the area of northwest North Dakota that is impacted. Due to the state's low incidence of earthquakes, North Dakota does not participate in the National Earthquake Hazard Reduction Program (NEHRP).

Figure 4.12-29: Peak Ground Acceleration 2% Probability of Exceedance in 50 years



Source: USGS, 2023

4.12.1.4.3 Geologic Hazards with a Remote Probability of Occurrence

Meteorites are just as likely to fall on North Dakota as any other location on the planet, making the likelihood of a meteorite fall occurring in the state very small. In recorded history, there has never been a significant consequence from either a meteorite impact or a volcanic eruption. This makes the likelihood of consequence in the next five years almost, but not completely zero. However, the ancient Yellowstone eruption, about 70,000 years ago, did produce ash deposits within the state. Also, the much more recent eruption of Mount St. Helens in May 1980 also produced ash falls across most of the state and into far northwestern Minnesota (see article and map at USGS: https://pubs.usgs.gov/gip/msh/ash.html).

4.12.1.5 Warning Time and Duration

This section briefly discusses the warning time and duration of geologic hazards by their category of probability and the duration of the event and its consequences.

4.12.1.5.1 Geologic Hazards of Common Occurrence

Landslides occur at an unobservable speed with regularity in North Dakota, and recent data upgrades make it possible to identify those small movements that will better enable forecasting the location of bigger movements with the capability to cause consequences. This new data improves warning time and helps to identify areas that may need intervention or warning signs ahead of an impactful landslide. Prevention will greatly reduce the impacts. Landslides that cause road closures often close them for a lengthy period since it is not just the road, but the nearby area that needs to be evaluated for future risk and mitigated appropriately using rock-catching mesh, blasting and/or regrading to stabilize the area. Erosion can also degrade the stabilization of slopes increasing the chances of a landslide. Heavy precipitation or rapid snowmelt can wear away essential soils that can then lead to a geologic hazard.

Figure 4.12-30 shows a landslide that resulted in a road closure on River Road in Burleigh County in 2019. There have been three landslides in this area since the last plan, leading to road closures each time. The area is currently being monitored and there are discussions about long-term solutions. These new advances increase the warning time for landslides and should decrease the duration of closure as more proactive action is taken, minimizing the impacts to areas like River Road.

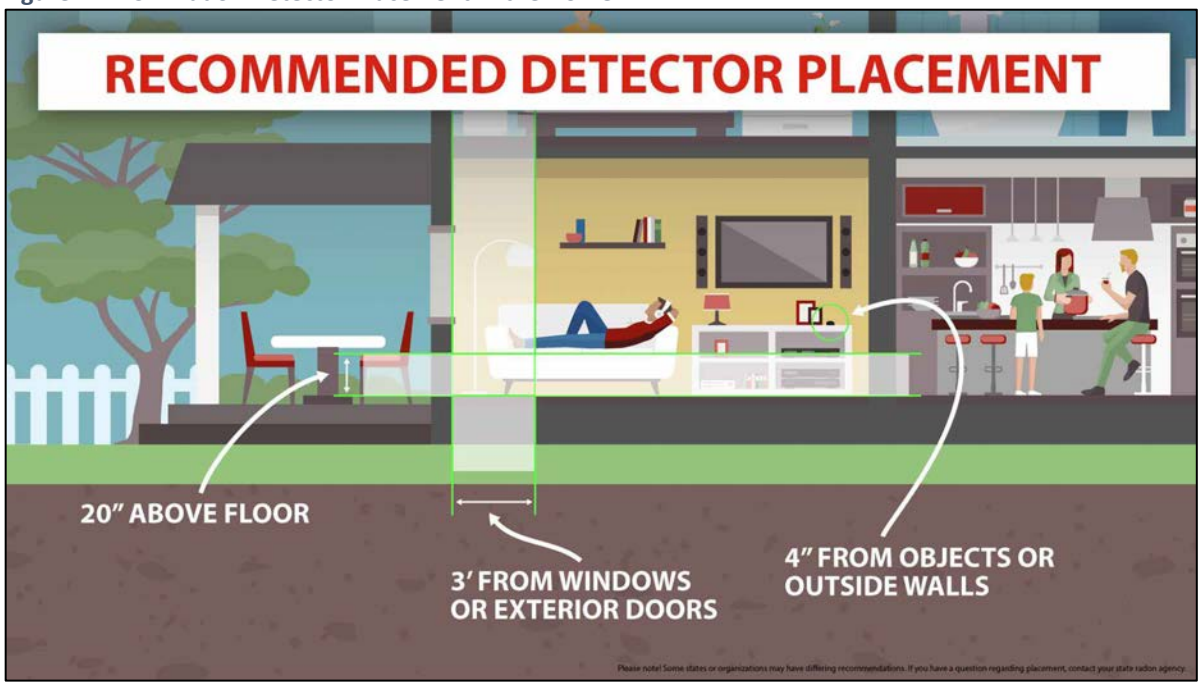
Figure 4.12-30: December 2019 Landslide on River Road, Burleigh County

Source: NDDES

AML is essentially a hazard of duration. The mine becomes a potential hazard at the point of abandonment, and an actual hazard at discovery until rehabilitation, which can take decades. The duration of the AML hazard can be long-term, in the case of lengthy exposure. A mine can go undetected for years until a person falls down the shaft of an underground mine or exposes a surface mine. The more resources that go into rehabilitation reduces the duration of the existence of known AML. Policy disincentives that reduce coal used nationally includes the negative externality of reducing the funds available to reclaim and rehabilitate AML, which may lead to the persistence of more AML consequences or the need to identify new revenue streams to address legacy AML.

The damage done by expansive soils tends to be a sudden consequence from heavy precipitation, snowmelt, or drought event. However, in many cases there are smaller cracks or bulges that may indicate a consequential event is on the horizon. In West Fargo, the city has extended its setback requirements near the river where there are areas of known expansive soil to minimize impacts and maximize warning time to people living or building in areas prone to this hazard (Freeman, 2023).

Figure 4.12-31: Radon Detector Placement in the Home



Source: Radonova.com, 2020

Testing is widely available for Radon. While health impacts occur slowly then endure, the ability to test provides the capability of a long warning time and the opportunity for intervention through the sealing of cracks in the home. According to EPA (2021), testing kits can be bought easily online or at hardware stores for a cost of about $40.

4.12.1.5.2 Geologic Hazards of Limited Occurrence

Erionite, uranium and arsenic can be detected from tests administered by the state or state-approved laboratories. For that reason, similar to Radon, the warning time of the onset of a hazard from the presence of these minerals should be considered long and the duration of exposure would increase the likelihood of negative health impacts.

Unlike the presence of minerals, earthquakes generally occur without warning and the duration of each event is unpredictable. The Tabbernor Fault/Fold System that produces earthquakes in North Dakota has not historically produced large earthquakes. According to the USGS (2023), this means that a large magnitude event that might impact the state would come from a great distance away, providing some advance warning.

4.12.1.5.3 Geologic Hazards with a Remote Probability of Occurrence

Meteorites, like earthquakes, usually provide no warning and give no indication that they are going to be entering the Earth's surface unless they are large enough to be caught by telescopes. According to

the Meteoritical Society (2023), their duration is generally quick in comparison to other geologic hazards.

A volcanic eruption may give indicators related to an uptick in volcanic activity such as earthquakes, ground swelling, increased gas release and venting of gasses. That said, these events can occur, and no eruption follows, or these precursors can last for decades. According to USGS (2023), while the USGS monitors Yellowstone and other American volcanoes for these precursors of an eruption, when the time comes, there may or may not be enough of a warning to take all protective actions.

4.12.2 Consequence and Vulnerability Loss Analysis

This section describes the consequences and vulnerabilities of geologic hazards.

A consequence is the "degree of debilitating impact that would be caused by the incapacity or destruction of critical infrastructure or a critical function" (FEMA EMI, 2023). Consequences can be tangible impacts to buildings or systems or intangible impacts on processes, business, or reputation. Consequences include debilitating impacts, such as the loss of critical functions, data, or public confidence. According to FEMA (2023), it also includes cascading effects that may influence functionality of critical services such as the loss of service of a utility or communications.

Vulnerability "is susceptibility to physical injury, harm, damage, or economic loss" (FEMA EMI, 2023). It considers the extent of injury and damage that may result from a hazard event of a given intensity in a given area. According to FEMA (2023), this may be a geographic, social, or economic feature that makes harm from a hazard more likely or more intense.

4.12.2.1 Human Loss

The risk to the public from landslides comes from falling rocks or sudden landslides along highways or roads for vehicle drivers. This is especially true where there are large slopes near highways or where roads follow along riverbanks prone to erosion. Underground AML poses a public risk to people, especially people exploring and getting stuck, lost, or injured, but this risk is low. Of the 1,743 AMLs in the state 541, or 31 percent, are listed as having underground features (North Dakota Public Service Commission, 2023). Unstable soils pose a trip and fall hazard to the public along sidewalks from cracks and bulges in concrete sidewalks and uneven land.

Radon's threat is entirely to the public, in the form of lung cancer. The other dangerous environmental minerals also pose a risk entirely to the public in the form of lung damage from erionite, all cancers from uranium and poisoning from arsenic in the water.

Figure 4.12-32: Tractor in an Abandoned Mine Land Sinkhole

Source: NDPSC AML Campaign, 2023

Earthquakes' threat to the public comes in the form of heavy items falling from above or being knocked off one's feet from the shaking, as well as indirect impacts from damage that might occur to critical infrastructure, such as loss of water service, power outages or structural damage to hospitals.

Theoretically, though unlikely, a meteorite could land on a member of the public or be large enough to cause localized ground shaking that could imitate the impacts from an earthquake. Also, in the unlikely event of a volcanic eruption, the ash that falls would have a severe impact on those who breathe it, damaging lungs and possibly killing those who breathe it in. Evacuation may be impacted by ash in engines that keep planes and vehicles from operating.

Those populations most vulnerable to geologic hazards are those along the Red River where there is expanding soil or in Dunn, McKenzie, and Williams counties where more landslides have occurred.

People who spend a lot of time in vehicles in landslide prone areas are particularly vulnerable to landslide hazards. In both Dunn and McKenzie Counties, the largest group of commuters are those that drive more than an hour to work, putting these commuters at a relatively higher risk. Young people who explore AMLs are those most at risk for an immediate human hazard, but environmental risks remain from the air and water exposure to minerals. Environmental minerals are more likely to affect those with co-morbidities such as existing heart and lung disease or cancer. **Figure 4.12-33** looks at the rates for some of these co-morbidities in the state. Radon and erionite can be particularly dangerous to individuals with existing lung disease. Radon would also be more likely to affect residents in homes that are deteriorating, letting radon into the indoor environment. People in deteriorating homes are more likely to be elderly, having stayed in their original residence and having a fixed income that may make repairs too costly, or those in poverty with limited options for affordable housing and an inability to address repairs due to a lack of budget, or in the case of tenants, due to a lack of control of the property.

Figure 4.12-33: Heart and Lung Co-Morbidities in North Dakota

Heart Disease Death Rate per 100,000, 2020	147.3
Adults With High Cholesterol, 2019	22.5%
Adults Who Have Ever Been Told by a Doctor that They Have Hypertension, 2021	36.3%
Asthma Prevalence Among Adults, 2017	8.6%
Adults Who Report Ever Being Told They Have COPD, Emphysema, or Chronic Bronchitis, 2021	5.5%

Source: Kaiser Family Foundation, 2022

4.12.2.2 First Responders

In addition to the risk to the first responders themselves as members of the public, first responders can be impacted by delays to response from detours created by landslides. Vulnerability to this consequence is especially high in lightly populated areas where there may be limited alternative routes. The closure of a road to repair landslide damages can greatly increase response times for emergencies on the other side of the slide closure from the first responders. Road closures could lead to isolation in areas where there are no alternative routes, impacting the ability of first responders to provide services and necessitating the need to evacuate and accommodate the temporary displaced by road closures.

Due to the remote nature of some AML, responding to a fall or injury in an underground mine may pose logistical threats to response. Ambulances and equipment may not be able to access the site of the emergency and first responders would be subjected to the same hazardous conditions as the person who needs assistance.

No other geologic hazard poses a direct threat to first responders above those for the general public. Other than delays in rural areas and challenges in response, there are no vulnerabilities for first responders.

4.12.2.3 Environmental, Natural, and Cultural Resources

Landslides, earthquakes, expansive soils, and AMLs all pose threats to the environment. Landslides, earthquakes, and expansive soils can cause leaks in pipelines and underground wastewater conduits impacting pipelines productivity and character. Landslides and earthquakes can also cause the character of certain landscapes to be altered from land movements.

Abandoned mines that have not been reclaimed can leach contaminants into the soil and impact groundwater. **Figure 4.12-34** shows an aerial view of the Fritz Uranium mine in 1990. This mine was exposed from the 1950s, when test pits were initiated until the early 1990s when the 155-acre mine was reclaimed. In the intervening time, rain fell on the site and carried dissolved minerals into the groundwater. Game animals and livestock may have drunk the water or fed on the grass fed by water from the mine.

Figure 4.12-34: Fritz Uranium Mine, 1990

Source: North Dakota Public Service Commission, 1990

In addition to environmental damage from infrastructure leaks and mineral leaching into groundwater, landslides threaten Tribal lands and burial sites. Historically, lands allocated for reservations were the most marginal and hazard-prone lands in the area, and this negative historical legacy may make Tribal lands more subject to landslides than those around them, creating an inherent vulnerability.

Landslides can also impact recreational roads and trails. Trails in the Badlands are particularly vulnerable to closure due to landslides, and it takes a much smaller landslide to close a hiking trail than a road.

Generally, areas within the Reservation that are susceptible to landslides hazard area as defined by USGS, are located away from developed areas. One exception is an area abutting the Four Bears Bridge.

(Three Affiliated Tribes Tribal Hazard Mitigation Plan, 2018)

The Double Ditch Indian Village State Historical Site (SW Burleigh County) suffered severe erosion caused by the 2011 Missouri River flood and has undergone bank stabilization. The site is monitored by the ND Historical Society on a biannual basis to include drone aerial inspections.

(Burleigh County Multi-Jurisdictional Hazard Mitigation Plan, 2020)

4.12.2.4 Property, Facilities, and Infrastructure Damage

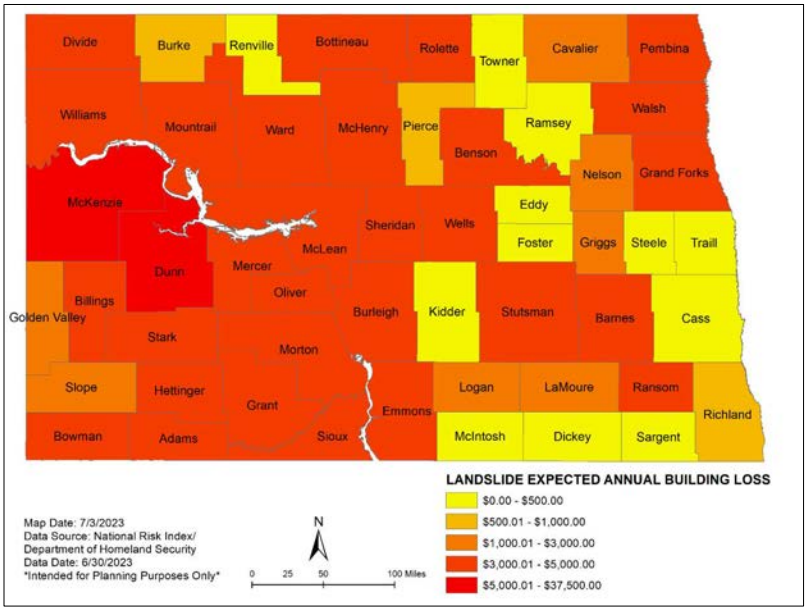
The primary risk from landslides and expansive soil is to property, facilities and infrastructure that can be damaged due to ground movement. Underground infrastructure, including sewer and water lines and mains are perhaps at greatest risk. Even small movements of the soil or land can cause leaks or breaks. These can introduce bacteria or other undesired elements to the water system. Similarly, wastewater leaks or pipeline spills can create environmental damage, in addition to disruptions in service. Both hazards threaten transportation infrastructure beyond roads. Airport runways, sidewalks, bridges, and dams can all be damaged by landslides, expansive soil and/or earthquakes that can impact the safety of these routeways. Erosion can be a catalyst for a geologic hazard event when moving from very dry to very wet or vice versa. A landslide near Johnsons Corner closed Highway 73 overnight in 2022 (North Dakota Department of Transportation, 2023). Nearby structures, including homes can be impacted from landslides and expansive soil, and minor damage to these structures can indicate a larger event on the horizon. According to FEMA (2023), the NRI considers the exposure of all buildings to earthquake hazards. **Figure 4.12-35** shows the expected annual loss of buildings from landslides. Dunn ($37,500) and McKenzie ($20,238.14) Counties have the highest estimated loss and are the only counties that have losses exceeding $5,000 annually.

Improvements in data and analysis for landslides can lead to better outcomes for infrastructure. Having better data means that more attention can be given to infrastructure built in areas where land is moving, including mixing in fill or regrading, and improving drainage before roads, bridges and

underground infrastructure is built, or evaluating existing infrastructure for damage in areas with known land movement. The ND Department of Transportation (NDDOT) has a geotechnical section that considers these data when designing roads.

Appropriate foundations for expansive soil that use deep pilings to stabilize the structure from slumps or changes in the land can minimize the impacts to property that lead to costly foundation repairs that can be devastating at the household level.

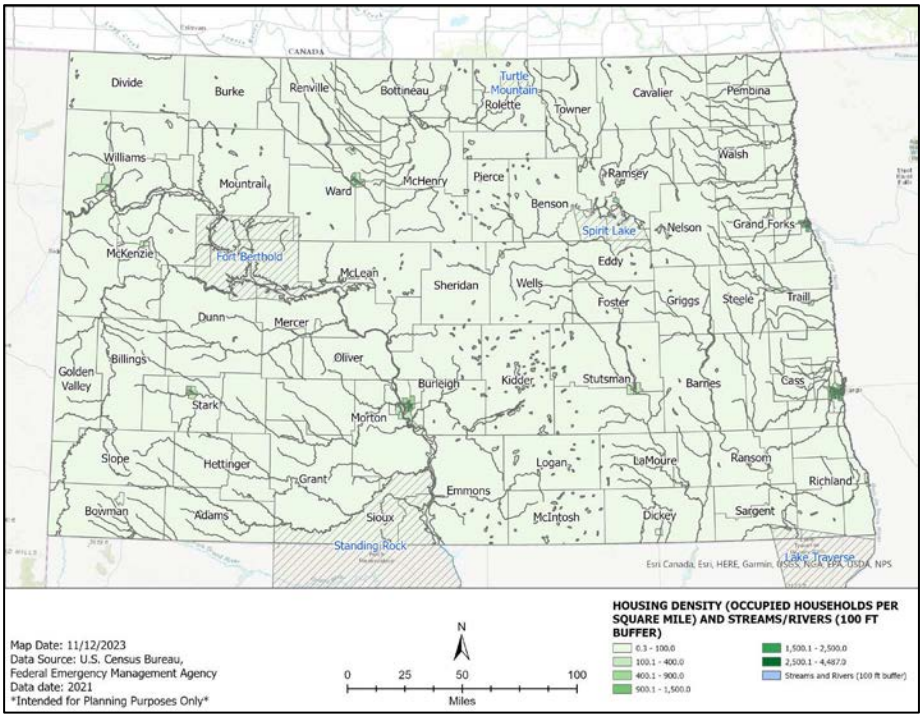
Figure 4.12-35: Expected Annual Building Loss from Landslides



Source: National Risk Index, 2023

Property located in erosion-prone areas, such as along riverbanks or cliffs, face a higher vulnerability to landslide hazards, no matter where in the state it may be located. Masonry structures would be more vulnerable than others to damage from a significant but unlikely earthquake; they can be easily damaged from the shaking force of earthquakes. **Figure 4.12-36** shows housing density near rivers. All areas in the state with increased density are along rivers. In total 68,179 of 315,542 households (21.5 percent) in the state are in census tracts that are within 100 feet of a riverbank.

Figure 4.12-36: Housing Density near Riverbanks

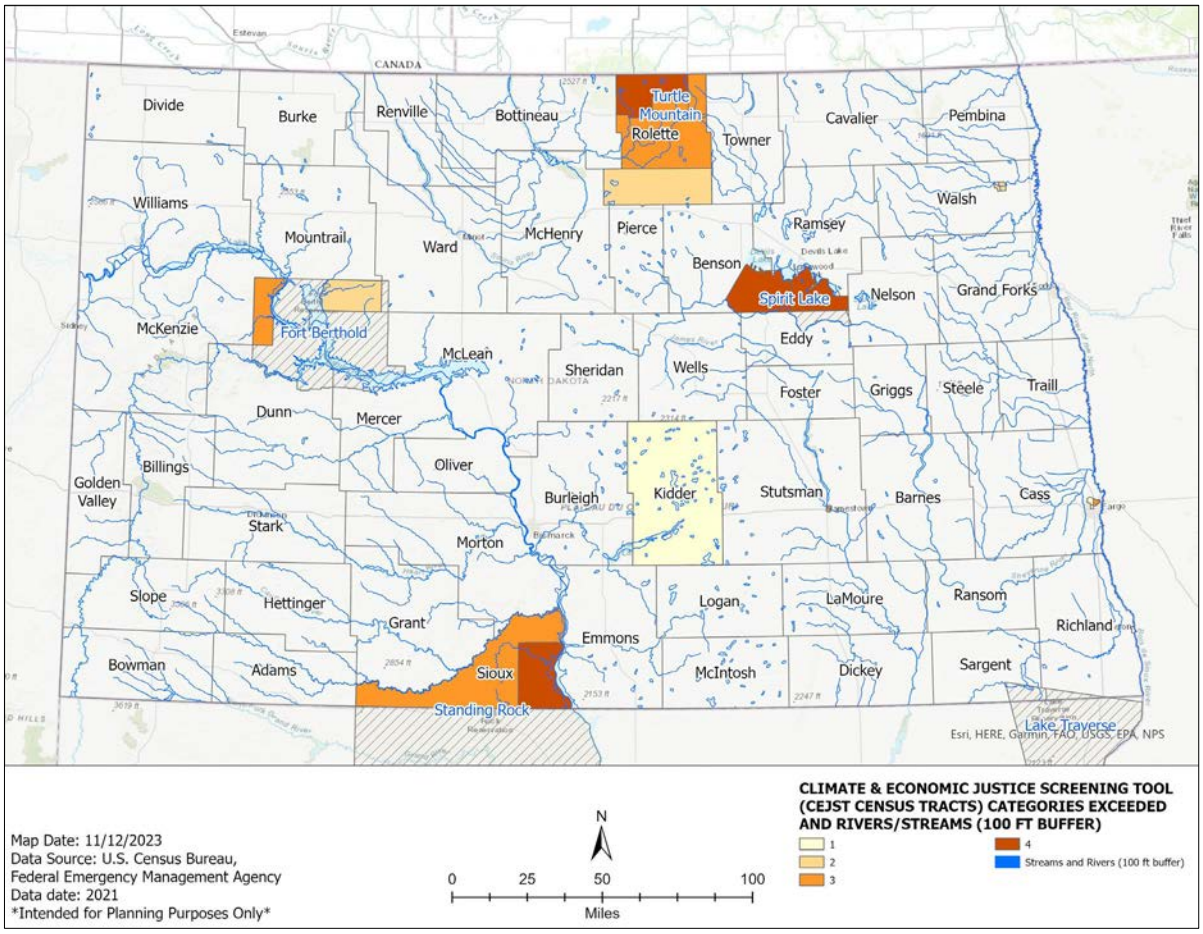


Source: FEMA, 2023; ACS, 2021

In communities that are already at-risk from climate change impacts or are economically less capable of bouncing back, the threat to in-bank infrastructure and personal property posed by landslides can be a difficult threat for a community to overcome. **Figure 4.12-37** shows the CEJST scores for the state.

Similar to areas of high population density the areas in the state with CEJST are heavily crossed by streams and some of the largest reservoirs and lakes in the state, creating landslide hazards in these areas. The areas that are depicted may experience greater barriers to geologic hazard.

Figure 4.12-37: CEJST Exceedance Areas



Source: Council on Environmental Quality,2023; FEMA, 2023; ACS, 2023

While older properties may be more likely to cause exposure to harmful materials, there is not a certain type or age of home that is more or less susceptible to geologic events such as earthquakes or landslides. Though, new state-built or regulated critical infrastructure is checked for geologic risk by the NDGS, minimizing this risk, but existing infrastructure sometimes predates this agency review program. Therefore, properties may have been placed in dangerous places or not built to mitigate existing geologic hazards. Most critical infrastructure is not state owned, meaning that local water and wastewater lines, septic tanks and water wells do not have the same safeguards against geologic hazards that new state-built properties do.

Communities that are growing into new areas for residential development run the risk for increasing property vulnerability to the geologic hazards of landslides and expansive soils. Areas with new subdivision development like in Fargo and Bismarck where new housing is placed in areas where expansive soils are common may place new development in riskier geologic areas. Much of the state east of the Missouri River face risk from expansive soils. Ward County's 2018 Multi-jurisdictional Hazard

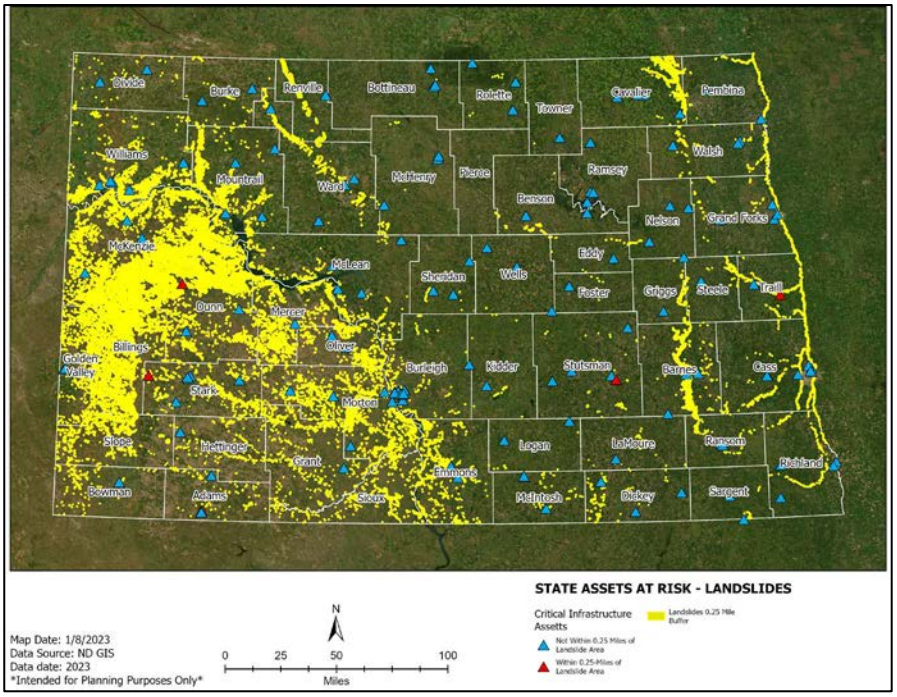
Mitigation Plan acknowledged that development does not need to be in the hazard-prone areas for issues to arise with landslides from above falling on roads and causing closures, as has happened in the past during wetter periods (Ward County Multi-Jurisdictional Hazard Mitigation Plan, 2018). This risk persists in other hilly areas of North Dakota, including areas like Kildeer, Medora and Marmarth. Riverbank and road-development landslides have impacted areas of Valley City, including a National Guard facility (Barnes County Multi-Jurisdictional Hazard Mitigation Plan, 2021). Similar landslides have plagued communities in Morton County (2020), Bismarck (Burleigh County, 2020) at the University of Mary and along River Road, and the Three Affiliated Tribal area near the Four Bears Bridge and along other water bodies (2018). Problems from unstable soils were acknowledged in areas like Foster County's Glenfield (2020), and in Morton County (2020). AML risks were noted in western areas near Hettinger in Adams County (2019) and in western Morton County, although these were areas of minimal risk to human development, they can still pose a risk to those who encounter them.

4.12.2.5 Critical Facilities, Community Lifelines, and State Assets

Critical facilities, community lifelines and state assets face many of the same risks as private property. Facilities or assets located on erosive slopes or in areas of expansive soil face more risk than others, and masonry structures face more damage in an unlikely earthquake.

Figure 4.12-38 shows the location of state assets relative to a 0.25-mile buffer of landslide risk in the state (NDGIS, 2023; NDGS, 2023). In total, eight assets lie within 0.25 miles of a mapped landslide risk, including five government facilities and nine communications facilities. The total value of assets near landslide risks are $31,586,507 with $28,938,000 in value represented by the North Dakota State Hospital in Jamestown in Stutsman County. Adams, Burleigh, Dunn, Stark, and Traill counties each also have state assets located near geologic hazards.

Figure 4.12-38: State Assets and Geologic Hazards

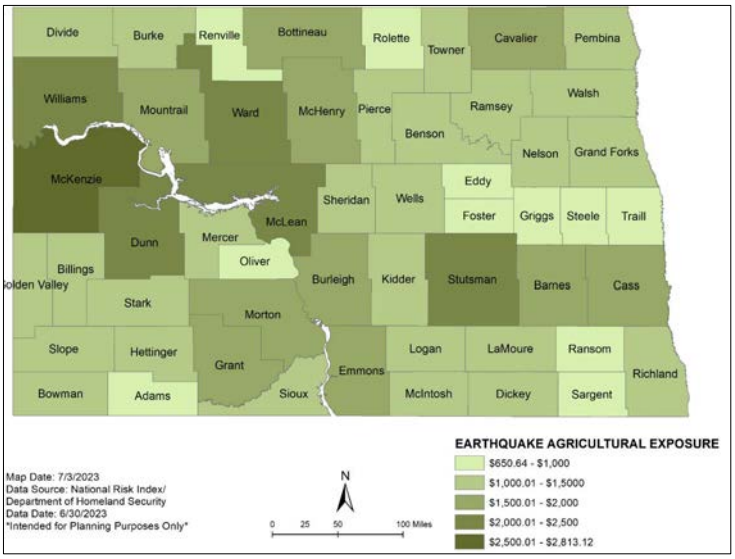


Source: NDGS, NDGIS

4.12.2.6 State Economy and Economic Disruption

Risks to the state economy are related to agricultural losses and loss of productivity related to road closures that increase the cost of transportation and may affect access to job sites, especially in remote areas, such as oil fields and mines. Shown in **Figure 4.12-39**, the NRI tracks the agricultural exposure to earthquakes. While no county exceeds $3,000 in exposure, Stutsman County and some western counties have more than $2,000 in exposure. **Figure 4.12-40** shows the reported crop insurance claims for earthquakes during the plan update period. Williams and Divide, where there is landslide susceptibility, and Cass, where there is riverbank erosion, have historically requested more assistance.

Figure 4.12-39: Agricultural Exposure to Earthquakes



Source: NRI, 2023

Economic vulnerability lies in the permanence of the ability to reroute trains and pipelines. Landslides and earthquakes that impact these routes could have impacts beyond their industry. Historically, there has been a landslide that has caused a derailment and temporary closure of tracks. This can impact the ability to get agricultural products to market. Similarly, pipeline damage from geologic hazards could lead to a temporary shutdown of a pipeline that would not just impact the crude oil industry, but could increase the cost of gas, impacting transportation costs across all sectors.

Figure 4.12-40: USDA Crop Insurance Claims by County for Earthquakes 2018-2022

County	Events	Indemnity Amount
Benson	3	$11,746.50
Bowman	1	$22,454.50
Eddy	1	$2,459.00
Emmons	1	$21,867.00
Griggs	1	$2,745.00
Nelson	1	$889.00
Ramsey	2	$4,222.50
Slope	1	$6,170.00
Towner	2	$45,461.00
Traill	1	$23,130.00
Total	**14**	**$141,144.50**

Source: USDA RMA, 2023

4.12.2.7 Delivery of Service and Continuity of Operations

Geologic hazards pose minimal threats to the delivery of services or continuity of state operations above the generalized threats to the public and the threats caused by road closures or damage to infrastructure. Damage to infrastructure may limit services such as water and wastewater services that may call on the state to assist localized areas. In an earthquake, meteorite or volcanic event of substantial size, damage to buildings may impact state operations, but that risk is extremely unlikely.

There is no direct threat to state operations posed by geologic threats beyond the highly unlikely event of a catastrophically large meteorite impact or a large eruption of Yellowstone, and thus there is no anticipated vulnerability to state operations beyond what is needed to accommodate detours from landslides.

4.12.2.8 Public Confidence in the State's Governance

The consequence for public confidence in the state's governance is low, largely because of the low risk of a significant impact from this hazard. However, when detours from landslides persist for lengthy periods, there is public frustration. A Highway 22 bypass detour near Killdeer in May 2011, persisted, and new landslides continued to threaten the highway. Even creating the detour was a geologic challenge. Additional deadlines forced the original July opening date to be pushed back (Dickinson Press, 2011). River Road in Bismarck experienced three different landslide closures between December 2019 and June 2022 (Bismarck Tribune Staff, 2022). Repeated and lengthy repairs related to landslides may cause disruption to the public.

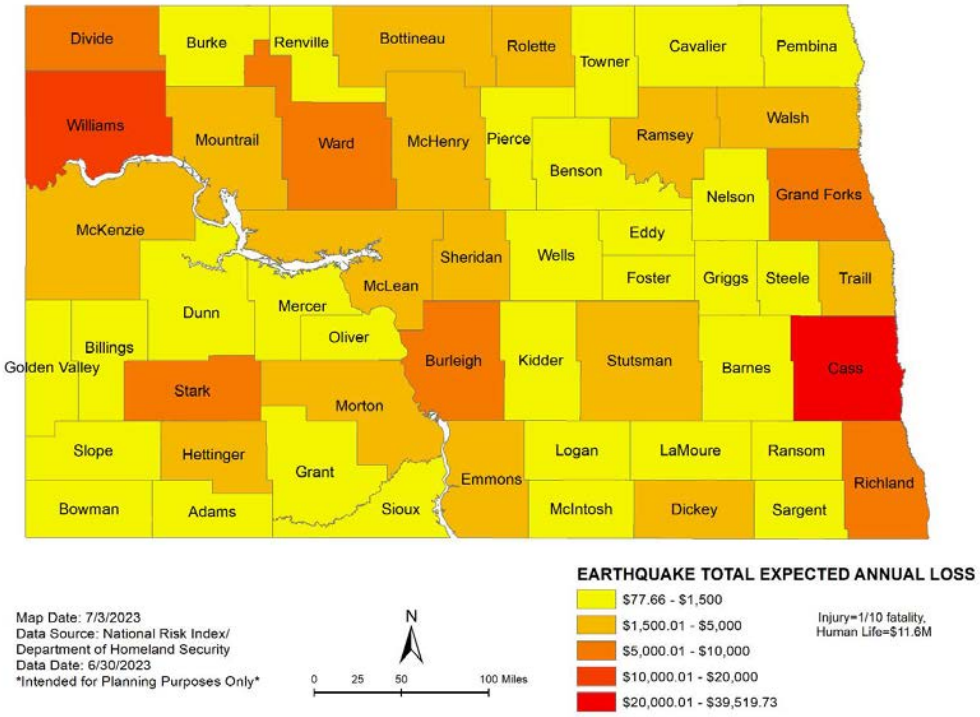
The state has worked to improve the knowledge base for geologic hazards that are common and has developed processes that ensure geologic risks are considered in the development of state infrastructure. The state makes resources and information available about common mineral hazards like radon and erionite and has a history of mine reclamation to buy down the AML risk. The threat to the public confidence in the state's governance is greatest when road closures persist or when large, unexpected events occur. Advances in data should make landslides near highways more predictable, and the practice of developing this plan helps the state consider the impacts from these somewhat unlikely events.

4.12.2.8.1 Estimation of Annual Losses

The NRI created by FEMA calculates the Expected Annual Loss (EAL) in dollars that a jurisdiction should anticipate from common hazards, shown in **Figure 4.12-41**. For landslides, the state should expect an annual loss of $918,545.11, with an uneven distribution among counties. According to FEMA (2023), Dunn ($182,500) and McKenzie ($105,862.81) Counties each have EALs exceeding $100,000. No other county exceeded $21,900 in loss.

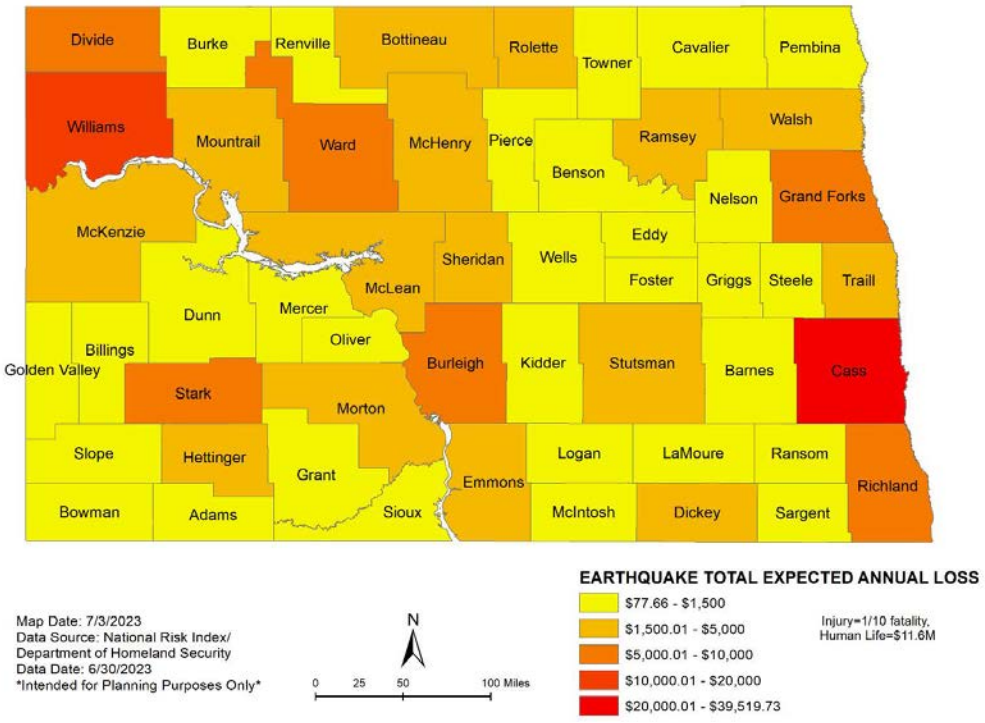
The NRI also estimates the EAL from earthquakes. Typically reports of agricultural damage are common because markets for perishable commodities can be impacted by non-local events. According to FEMA (2023), Cass County has an EAL of $39,519.73, leading the state. The state's total EAL from earthquakes is $161,200.44, distributed as shown in **Figure 4.12-42**.

Figure 4.12-41: Expected Annual Loss for Landslides



Source: NRI, 2023

Figure 4.12-42: Expected Annual Loss for Earthquakes



Source: NRI, 2023

Another method to evaluate the threat to the state from geologic hazards is to consider the USDA Risk Management Agency Crop Insurance claims for relevant hazards. **Figure 4.12-43** summarizes the actual claims made between 2018 and 2022 for earthquakes for each commodity. Wheat growers claimed the most loss over the period, with a total of $62,911, or $12,582.20 per year in the state. Corn, dry beans, and soybeans were closely clustered around $5,000 in loss per year since the last plan update. Towner County leads claims amounts with $45,461 in claims across two events. According to USDA Risk Management Agency (2023), in total, $141,144.50 was claimed, 8 in 10 North Dakota counties for an expected annual agricultural loss of $28,228.90.

Figure 4.12-43: USDA Crop Insurance Claims by Commodity for Earthquakes 2018-2022

Commodity	Amount	Annualized
Wheat	$62,911.00	$12,582.20
Corn	$25,199.50	$5,039.90
Dry Beans	$23,130.00	$4,626.00
Soybeans	$22,756.00	$4,551.20
Dry Peas	$6,170.00	$1,234.00
Barley	$978.00	$195.60
Total	$141,144.50	$28,228.90

Source: USDA Risk Management Agency, 2023

4.12.2.9 Community Resilience

The state has taken steps to improve community resilience to geologic hazards, the largest of which is increasing the knowledge base around landslides and inserting more geologic approvals in state infrastructure projects. For example, in January 2023, the NDGS completed landslide area inventory mapping across the entire state at the detailed scale of 1:24,000. North Dakota is one of the first states to have completed such a survey using LiDAR elevation surface models as the base. By addressing issues related to geologic hazards during permitting and design, there are fewer surprises later.

4.12.2.10 Future Conditions

This section evaluates how changes in existing conditions may impact geologic hazards and the consequences that they cause. Through the end of this century in North Dakota, expect more frequent, larger, and more intense geologic hazards, such as landslides, riverbank collapse and sink holes. The following list is based on information extracted from the National Oceanic and Atmospheric Administration National Centers for Environmental Information, summary for North Dakota (Frankson, 2022), the Fifth National Climate Assessment (Knapp, 2023), and related resources:

- **Location.** The locations of geologic hazards within the state are not projected to change.
- **Extent/Intensity.** The extent and intensity of geologic hazards may change due to climate change, as impacts from projected future climate temperatures and/or precipitation increase.
- **Frequency.** Both drought and heavy precipitation events are projected to occur more frequently, which may contribute to an increased frequency of landslides where steep slopes are present or to riverbank collapse where undercutting due to subsoil flow and/or antecedent flooding is possible. There is also a potential for increased wind and water erosion.
- **Duration.** The duration of geologic hazards is not projected to change.

Planning mechanisms and geologic mapping has made it easier to avoid geologic risk for state projects, large developments and infrastructure. Smaller development projects that do not require state geologic review may still end up in areas of geologic risk. Urban growth – particularly south and west of Fargo and north of Bismarck – is occurring in areas of known unstable soils that can cause serious damage to residential properties that exceeds what many North Dakotan households can afford to remediate. North Bismarck is the primary area of current residential and commercial development for the capital city at this time. There are also areas of unknown soil stability that may become problematic. Particularly in western North Dakota near Williston, there are expansive soils. But while development has not yet encountered issues, future development may face risks yet unknown from expansive soils.

Meandering rivers, particularly the Red River and Sheyenne, can place new areas at risk over time, as riverbank erosion may threaten existing or new development that was considered not at risk at the time of development. Recreational homes and other properties along the Missouri River and larger lakes may also face landslide risks from changing hydrology and soil conditions. The Three Affiliated Tribes hazard mitigation plan acknowledges concerns about landslides near the Four Bears Bridge and a history of impacts to rural roads, especially during wetter times (Three Affiliated Tribes Tribal Hazard Mitigation Plan, 2018). The Ward County Multi-Jurisdictional Hazard Mitigation Plan (2018) acknowledged that the threat from landslides in western North Dakota, where terrain is steeper can come from wet conditions and saturated hillsides along roads, causing slope collapse onto the roadway, which is a hazard less likely in areas of growth in eastern portions of the state.

4.12.2.10.1 Extreme Climate Variability and Climate Change

Through the end of this century North Dakota's natural yet extreme climate variability will continue to be the primary influencer or signal within each natural hazard (Frankson, 2022). This may directly or indirectly impact areas and peoples across the state over days to decades long timescales, while the much more subtle and gradual trends of climate change over the rest of this century act to extend the range of such variability (Knapp, 2023). Such studies show that both trend and variability could extend beyond that which has previously been documented in the historical record.

Recent climate change trends have shown, and future projections suggest that the state can expect continued gradual warming in all seasons, with greatest warming in the winter season. Overall precipitation is likely to increase, but with a high degree of inter-seasonal and interannual variability, which could lead to longer and stronger droughts interspersed with more frequent and more intense flooding (Swain, 2015). Severe summer and winter storms will continue to occur in both drier, drought-prone periods and wetter, flood-prone periods within the state's overall extreme climate variability. According to the Federal Highway Administration (FHWA, 2023), extreme weather events, warming temperatures, extreme cold weather and increased precipitation can contribute significantly to geohazards' frequency, severity and intensity. And in North Dakota, future climate projections include all these extreme weather event types.

The last few decades have seen a period of dramatic increase in precipitation across North Dakota, with an overall lower than normal frequency in drought conditions and a greater frequency of floods. Often referred to as a protracted wet cycle (Voiland, 2020), the markedly wetter conditions across the state from 2019 through late 2022 are still considered to be part of the region's natural variability (Hoerling, 2010; Hoerling, 2013; Hoell, 2023). Just as flash floods can occur under conditions of more intense

precipitation, even during a drought, flash drought can occur under conditions of extremely drier conditions and higher temperatures, even within an overall wetter climate pattern (Otkin, 2018). In North Dakota, drought or flash drought conditions often occur in rapid sequence with excessive wetness and flood or flash flood episodes, from one month, season or year to another.

During an extended drought period, increased wildfire activity, burn scarred landscapes and reduced evapotranspiration can further increase rainfall runoff rates and the risk of localized flooding or flash flooding (Williams, 2022). Rapidly changing landscape conditions are expected to increase under future climate scenarios with more frequent and intense periods of both drought and flood, leading to a more frequent incidence of destabilization of many geologic features (FHWA, 2023). Under future climate conditions, the rapid cycling of flood to drought should also increase.

Recent statewide examples of rapid change from flood to drought include the 2011 flood/2012 drought/2013 flood sequence; the 2017-18 drought/flash drought into 2019 flood sequence; and the 2021 flash drought with embedded flood and flash flood episodes.

4.12.2.10.1.1 Impact

Floods and droughts can induce geologic hazards through the expansion and/or shrinkage of clay soils. Shrinkage can result in deep soil cracks and soil pulling away from building foundations or other structural elements. Heavy rainfall occurring over previously drought-stricken lands can produce increased erosion as rushing runoff penetrates and erodes deep soil cracks. As vegetation withers and soils crack, both wind and water erosion can increase across fields and rangeland, on the sides of roadbeds and across other more highly sloped terrain. Deep soil cracks along earthen spillways and alongside edges of concrete revetments or spillways can increase the risk of future structural damages.

Water can more easily penetrate the soil cracks near building foundations leading to leakage into basements and possibly weakening foundation supports (FWHA, 2023). Low water levels in streams and rivers can lead to the undercutting of the streambank/riverbank and subsequent sink hole formation or riverbank collapse. These are just a few of the geohazards that are likely to be exacerbated by projected future climate extremes. An extensive list of Future Climate impacted geohazards with specific references can be found in the Federal Highway Administration manual, FHWA-HIF-23-008 (FWHA, 2023), Table 2-2, p.12.

Although not traditionally thought of, University students continue to be an underserved population during disasters. Many are already in a new environment with limited resources such as transportation, financials, and a close social network placing barriers on students. The University of Mary in Bismarck, ND has worked on a large Slope Stabilization project to ensure the stability of the slope the school sits atop (Meyer, 2023). This project will protect the University of Mary's Infrastructure, students, and staff from geologic hazards such as landslides into the future. Through Hazard Mitigation Assistance (HMA) the total local-state-federal project cost for completed Phase I of the project totaled to $3,793,185.00 (NDDES Recovery Section, 2023). Phase II and Phase III are in progress and will continue to provide stability to the University of Mary far into the future.

4.12.2.10.1.2 Adaptation

Adaptation actions might include the regular repair and maintenance of roadbeds and railbeds, regular cleaning of ditches and natural waterways and proper tillage and landscape care. Additional actions may be like those discussed as mitigation actions below.

4.12.2.10.1.3 Mitigation

With a potential for increased size, intensity, frequency and/or duration of both heavy precipitation (with flooding) and drought there should be an increased emphasis on longer-term mitigation strategies which reduce exposure extremes of drought and flood and strategies that minimize cascading effects, including rapid changes from drought to flood and flood to drought. The following list is the same as that found under the future climate and drought hazard:

(Note: always contact appropriate jurisdictional engineering and authorities for recommended actions or modifications.)

- **Agriculture/Cropping Strategies:** Field erosion may be reduced though low-till, no-till efforts and through increased green edging setback along drainage ditches. According to the Natural Resources Conservation Service (2023), extreme drought conditions can reduce the effectiveness of such mitigation efforts as vegetation wilts or dies, though some benefit will generally remain.

- **Rangeland/Cropping strategies:** Include grazing management and implementation of a grazing system that enhances resilience. Development of water sources that reduce reliance on surface water, ensuring grazing livestock have adequate, good quality water (Haigh, 2018; Derner, 2017; Smart et al., 2021). Also consider the development of drought plans for ranches.

- **Forest Thinning and Care:** In climates subject to such extreme variability in temperature and precipitation as North Dakota, our native forests, rural shelterbelts, parks, greenways, and urban streetscapes can all benefit from proper forest thinning to help maintain forest health and reduce the impacts of drought, when it occurs. Appropriately thinned stands can reduce gross moisture needs, limit the spread of pests and diseases, increase herbaceous growth and forage for wildlife, and reduce the risk of catastrophic wildfire while reducing blowdown and/or windthrow potential (Safford et al., 2013; Johnson, 2021; Claeys, 2020). New drought/heat tolerant tree varieties can be introduced at 5-10 percent per year.

- **Wetland Maintenance.** In using downscaled CMIP5 and an improved Prairie Pothole Model (PHyLiSS: Pothole Hydrology Linked System Simulator model), North Dakota based researchers have found that the new method shows some variation in overall May Pond numbers, and "when combined, our results suggest areas in the PPR that currently support the highest densities of intact wetland basins, and thus support the largest numbers of breeding-duck pairs, will likely also be the places most critical to maintaining continental waterfowl populations in an uncertain future" (McKenna et al., 2021). Translation: concentrating on overall wetland health and preventing additional wetland drainage may be the best strategy, since the Prairie Potholes appear to have a robust resiliency (personal conversation with author).

- **Transportation:** According to NDDOT Long-Range Transportation Plan (2023), soil crack repair or filling on roadbeds and spillways could include reseeding methods that protect new growth and disturbed soils from the added erosive action caused by subsequent heavy rain episodes.

- **Dam Safety:** Efforts underway to increase overall reservoir and/or spillway capacity (USACE, 2023; USBR, 2023; NDDWR, 2023). For example, upgrading earthen spillways may help reduce certain erosion possibilities that could increase as both drought and flood increase in size, intensity, frequency and/or duration (FWHA, 2023). Jurisdictions should contact local or state engineering for aid in assessing appropriate actions.

- **Water Supply/Water Quality:** North Dakota has been investing for decades in upgrades and expansions of water supply systems that greatly improve resiliency to drought. The Department of Water Resources and State Water Commission Cost-Share Program provides up to 60 percent and 75 percent cost-share assistance for municipal and regional/rural water supply projects, respectively (NDDWR, 2023). The establishment of well-defined thresholds for implementing water restrictions at different levels can help mitigate drought impacts. According to Keana et al. (2022) and Meehan and Mostrom (2021), nutrient management can be used to address some water quality concerns, such as Harmful Algae Blooms.

- **Human Health:** Both adaptation and mitigation measures would likely involve careful monitoring of geologic hazard prone areas, with rapid response to control access to damaged and/or dangerous areas and to complete any needed repairs (NDPSC, 2023). Zoning restrictions can help reduce the likelihood of having homes and businesses located in or near hazardous areas.

- **Socio-Economic:** The Bank of North Dakota (BND) has recently hired a Sustainability Officer to help plot an economic course for dealing with future climate conditions in the state (BND, 2023). Other state agencies are engaged in pooling such efforts/resources enroute to more integrated state action planning, much as has been done as part of this Enhanced State Hazard Mitigation Plan.

- **Vulnerable Populations:** Education efforts are likely needed to ensure both new and established residents, or those with special needs, are aware of areas prone to geologic hazards (ND Mitigation Strategy Mtg., 8 Nov 2023; NDHHS-CEU, 2023) and resources made available to assist in buyouts/relocations as conditions warrant.

- **Energy Production and Use:** The Bakken oil boom has led to a dramatic increase in construction, traffic, and overall transportation and land-use changes (NDDMR, 2023). This has necessitated dramatic increases in infrastructure, regulation, and repair/maintenance.

- **Tribal/Local:** During the 2023 North Dakota Legislative Assembly, the passage of House Bill 1385 provided the ability of the State Water Commission to enter into agreements with Tribal Nations – making them eligible for funding assistance through the Cost-Share Program (NDGO, 2023;

NDDWR, 2023). The Department of Water Resources and State Water Commission Cost-Share Program provides up to 60 percent and 75 percent cost-share assistance for municipal and regional/rural water supply projects, respectively.

Additional mitigation strategies are discussed within the Transportation, Flood, Drought, Severe Summer, and Severe Winter Weather profile sections.

4.12.2.10.2 Other Changes

While technological and data changes have improved the ability to forecast and mitigate landslide risks, there are negative changes that the state should consider over the next five years.

Growth in urban areas like Williston, Bismarck, Grand Forks, and Fargo is occurring in areas where there is expansive soil and inability to consider the impacts or identify the presence of the hazard may be putting the new occupants at risk. The urban areas of the state are anticipated to have a 24.6 percent growth rate between 2020 and 2040 (U.S. Census Bureau, 2020). Areas in and near Fargo, Grand Forks, Bismarck, and Williston will see more infill development and development on their fringe and nearby smaller communities, increasing the amount of property and people in the way of landslides and expansive soils.

Figure 4.12-44: Newly constructed school near Killdeer

Source: Jason O'Day/Dickinson Press

The growth in western North Dakota counties is occurring in areas that are relatively more subject to landslides and risks from erionite and uranium. The western North Dakota Counties of Dunn, McKenzie, Mountrail, and Williams have grown at a rate of 72.3 percent since 2010 (U.S. Census Bureau, 2020), and growth is expected to continue at a rate of 54.9 percent. This has already led to new development in areas like Williston, Minot and Dickinson and the rural areas between them. Accommodating the booming oil and gas workforce and their young families will increase development and critical infrastructure in these areas, placing more people and property at risk from harm from AML and landslides.

The influx of new residents from states and countries that may not face the same risks of environmental minerals like radon and arsenic may be unaware of the risks or how to go about getting wells and structures tested.

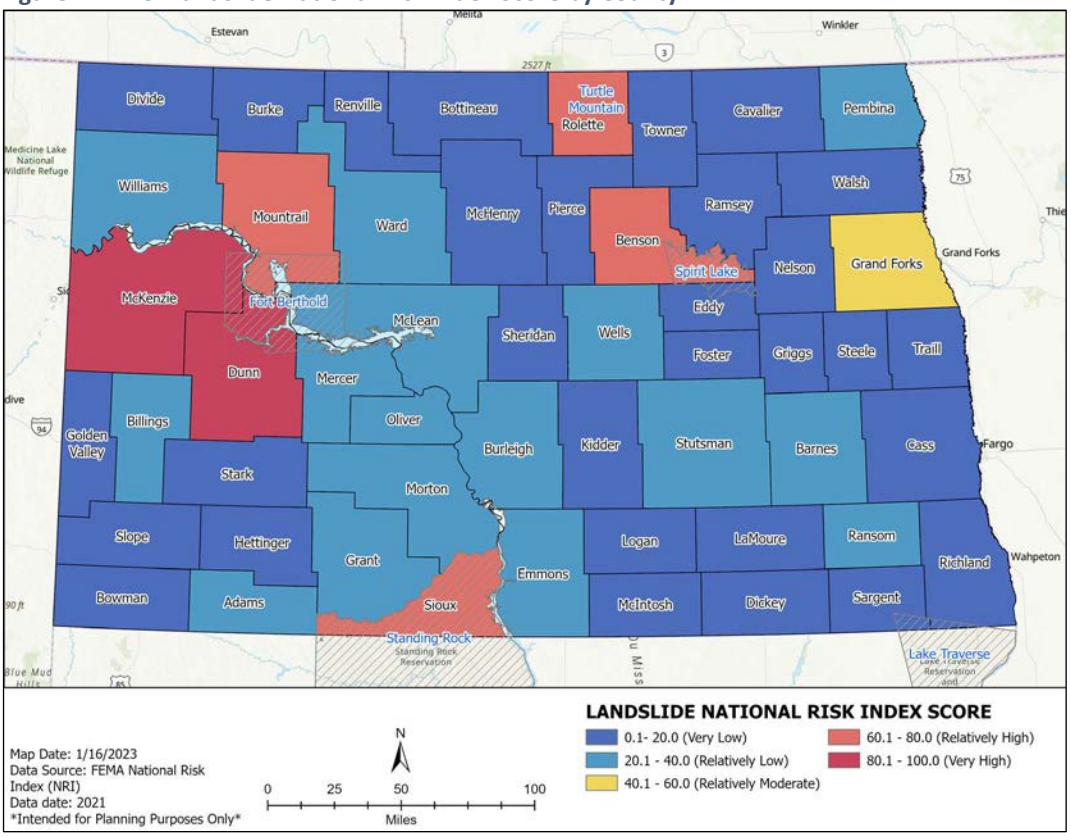
4.12.3 Risk Analysis

Risk can be defined as the potential for loss of or damage to an asset (FEMA Emergency Management Institute [EMI] 2023). This section analyzes the potential for loss or damage in the state of North Dakota.

4.12.3.1 National Risk Index (NRI)

The National Risk Index leverages available source data for natural hazard and community risk factors to develop a baseline risk measurement for each U.S. County and Census tract. The risk equation behind the Risk Index includes three components: a natural hazards component (Expected Annual Loss), a consequence enhancing component (Social Vulnerability), and a consequence reduction component (Community Resilience). The dataset supporting the natural hazards component provides estimates measured in 2022 U.S. dollars. The datasets supporting the consequence enhancing and consequence reduction component have been standardized using a minimum-maximum normalization approach prior to being incorporated into the National Risk Index risk calculation. Using these three components, composite Risk Index values and hazard type Risk Index values are calculated for each community (county and Census tract) included in the Index. Risk Index values form an absolute basis for measuring Risk within the National Risk Index, and they are used to generate Risk Index percentiles and ratings across communities. Categories of risk are determined by using quintiles to determine categories, where 0-19.99 are low risk, etc. Risk scores are relative to other counties nationally. FEMA's NRI scores relative risk for the geologic hazards of landslides, earthquakes, and volcanoes. North Dakota's risk for volcanic hazards was not high enough to score but **Figures 4.12-45** and **4.12-46** show the NRI Scores for Landslides and Earthquakes in the state, respectively.

Figure 4.12.45: Landslide National Risk Index Score by County



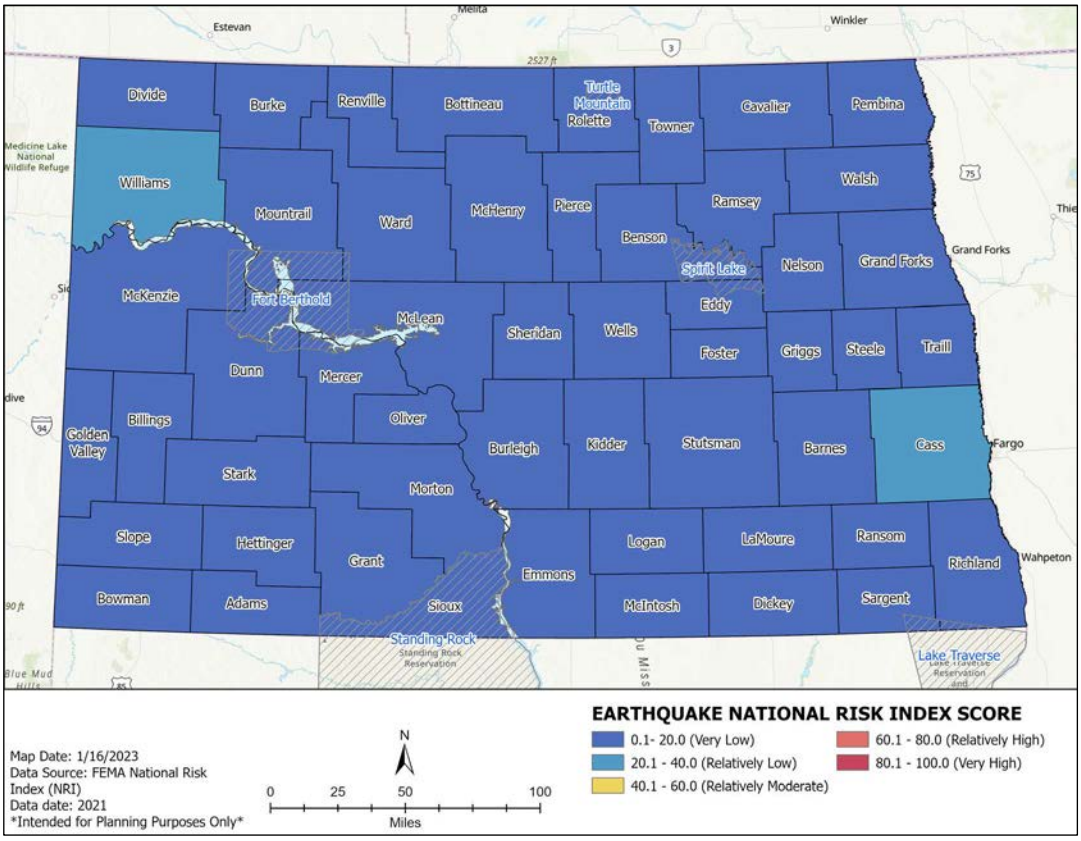
Source: NRI, 2023

Just McKenzie (83.0) and Dunn (93.9) counties register nationally as having a high risk for landslides (NRI, 2023). The Missouri River Valley, Turtle Mountain, and Devils Lake have relatively higher risk when

compared across the state, but rate only moderately high in comparison to counties nationwide (NRI, 2023), as shown in **Figure 4.12-45**.

Figure 4.12-46 shows the NRI by county in North Dakota for earthquakes. Cass (30.7) and Williams (22.3) are the only counties to score above 20.0, but their scores are still considered relatively low. Every other county in the state is considered to be in the lowest risk category nationally (NRI, 2023).

Figure 4.12.46: Earthquake National Risk Index Score by County



Source: NRI, 2023

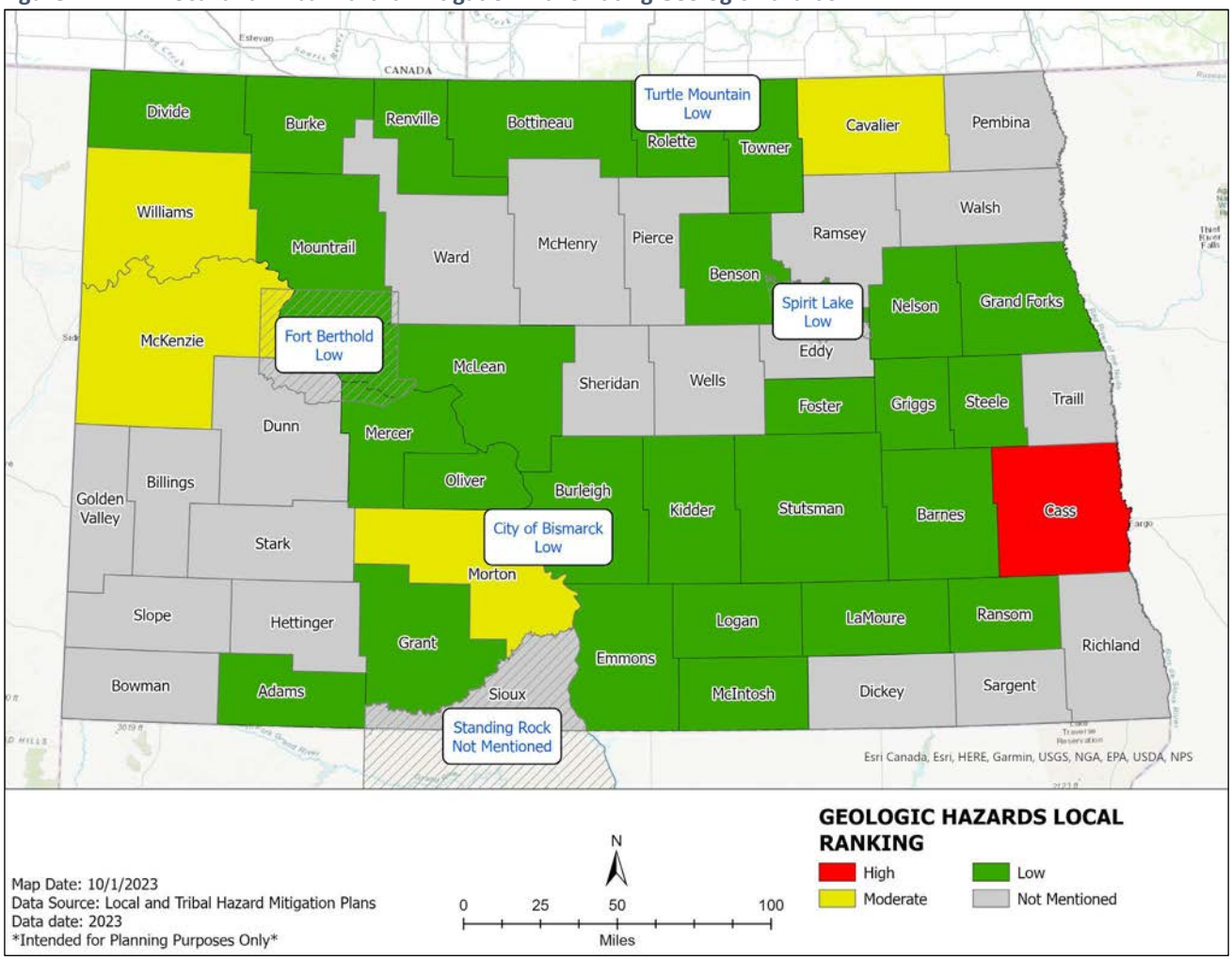
4.12.3.2 Risk Index Score

The Priority Risk Index for this plan update ranks geologic hazards as a low risk with a score of 1.9. Geologic Hazards is tied for 12 out of 15 hazards.

4.12.3.3 Jurisdictions At Risk

When evaluating local and tribal mitigation plans, 36 of 58 of the adopted plans identify geologic hazards as a hazard impacting their jurisdiction, as shown in **Figure 4.12-47**. However, of all plans that ranked hazards, 31 considered it a low risk. Cass County is the only jurisdiction to identify geologic hazards as a high risk, as according to the Cass County Multi-Jurisdictional Multi-Hazard Mitigation Plan (2023), unstable soils and slumping along rivers has been a concern throughout the county.

Figure 4.12-47: Local and Tribal Hazard Mitigation Plans Rating Geologic Hazards



Source: Local and Tribal Hazard Mitigation Plans, 2023

4.12.4 Summary/Conclusion

The following bullets demonstrate highlights and conclusions related to geologic hazards.

- The growth in population in western North Dakota places more people and development in areas at risk for geologic hazard.
- Tribal communities appear to have a higher risk. State, local, and federal partners may choose to allocate resources and data.
- The NDGS has greatly improved its knowledge base and data availability related to geologic risks. Continue to promote that data and proliferate its use among communities. Based on risk, audience size may increase.

- New technology may increase awareness of highway areas at risk for geologic hazard. Signage can clearly communicate for commuters. This may also better evaluate infrastructure in newly identified risk areas.
- AMLs and landslides areas will continue to be a problem for energy infrastructure development in North Dakota. Areas of extreme growth may experience greater risk.
- With AML reclamation money tied to the sale of coal, and policy that disincentivizes the burning of coal, new resources may need to be identified to mitigate AML risk.
- Expansive soils will continue to be a problem in North Dakota as urbanized areas like Bismarck and Williston grow into areas previously undeveloped.
- There are best practices for developing property safely in expansive soils, and the state could encourage promotion of these practices in the local construction industry.
- The City of West Fargo increased setbacks and completed many property buyouts in known problematic areas for landslide areas along the Red River to reduce losses. Encouraging adoption of this approach by other counties can reduce the risk, which can be costly for households.
- As homes settle, the opportunity for radon to enter the indoor environment increases, however, testing for radon is inexpensive.
- The need to identify areas where erionite, uranium and arsenic is present in the soil remains incomplete. The presence of these materials can also be determined through testing.
- A large earthquake with significant consequence is unlikely to impact the state, but small earthquakes and impacts from earthquakes outside the state's boundaries are more common.
- Pipelines and underground infrastructure such as water lines, wastewater lines and buried powerlines may be at risk of damage that creates environmental harm in the event of an earthquake, landslide, or expansive soil condition.
- Meteorite falls and volcanic activity remain remote possibilities in the state, but citizens may experience volcanic ash or smoke events.

4.12.5 Data Limitations

Data for this section was pulled from a variety of state, local and federal sources. Private and municipal infrastructure data was not included or sought for this state-level plan and may provide a more holistic description of risk if it were included.

4.13 Terrorist, or Nation-State Attack

4.13.1 Overview

This section examines the risks posed by an attack from a terrorist group or a nation-state as it would impact the state of North Dakota. These would include any chemical, biological, radiological, nuclear, explosive, industrial, food/food production, or armed assault intended to force political action or to single out a group of people for harm. These incidents are examples of human-caused hazards that are intentional and often planned. Some of these human-caused adversarial attacks may cause cascading impacts or target critical infrastructure such as dams, hospitals, or energy production or transmission.

4.13.1.1 Description

The Federal Bureau of Investigation (FBI) identifies two categories of terrorism – international and domestic. International terrorism is defined as "violent, criminal acts committed by individuals and/or groups who are inspired by, or associated with, designated foreign terrorist organizations or nations (state-sponsored)" (FBI, 2023). Domestic terrorism is "violent, criminal acts committed by individuals and/or groups to further ideological goals stemming from domestic influences, such as those of a political, religious, social, or environmental nature" (FBI, 2023). In both types, the goal of the actor is to intimidate, coerce or influence the civilian population or government into taking an action or choosing not to take an action, such as halting construction or leaving the community. North Dakota follows the FBI's categories of terrorism:

Identifying and Reporting Suspicious Activity

The North Dakota State Local and Intelligence Center (NDSLIC) is the primary state agency for terrorism and has a system to report suspicious activities to the state for further investigation (NDSLIC, 2023). Online reports are made at https://apps.attorneygeneral.nd.gov/tips. But how is suspicious defined? The NDSLIC follows the **N**ationwide **S**uspicious Activity Reporting (SAR) **I**nitiative (NSI) regarding the following indicators of terrorism or criminal behavior:

- Breach/attempted intrusion of a nonpublic area
- Misrepresentation to hide illegal activity
- Theft/loss/diversion of articles associated with a building or infrastructure, such as a uniform or security badge
- Sabotage/tampering/vandalism of a building or infrastructure
- Cyberattacks
- Expressed or implied threats
- Suspicious aviation activity
- Eliciting information about a building
- Testing or probing of security
- Recruiting/financing the gathering of information about a building, its staff, or financials
- Suspicious photography of buildings or security features
- Suspicious observation/surveillance of structures or infrastructure beyond professional or touristic curiosity
- Materials acquisition or storage of unusual materials that could be used in an attack
- Acquisition of security, weapons, or tactical skills
- Collecting weapons
- Suspicious sector-specific incidents, i.e., public health sector

- **International terrorism** -- Violent, criminal acts committed by individuals and/or groups who are inspired by, or associated with, designated foreign terrorist organizations or nations (state-sponsored) (FBI, 2023).
- **Domestic terrorism** -- Violent, criminal acts committed by individuals and/or groups to further ideological goals stemming from domestic influences, such as those of a political, religious, social, racial, or environmental nature (FBI, 2023).
- **Lone offenders** – (FBI, 2023). Terrorist threats evolved from large-group conspiracies toward lone-offender attacks can be domestic or international terrorism. These individuals often radicalize online and mobilize to violence quickly. Without a clear group affiliation or guidance, lone offenders are challenging to identify, investigate, and disrupt.
- **Foreign Terrorist Organizations (FTOs)** -- Foreign organizations that are designated by the Secretary of State in accordance with section 219 of the Immigration and Nationality Act (INA), as amended (U.S. Department of State, 2023). FTO designations play a critical role in our fight against terrorism and are an effective means of curtailing support for terrorist activities and pressuring groups to get out of the terrorism business. Attacks under this categorization can be international or domestic.

In its 2023 Strategic Intelligence Assessment submitted to Congress, the FBI designates five threat categories of domestic terrorism, which are defined as followed:

1) **Racially or Ethnically Motivated Violent Extremism** – violent acts or threats that are derived from bias of the actor against a given population group, often a racial group.
2) **Anti-Government or Anti-Authority Violent Extremism** – violent acts or threats derived from an anti-government or anti-authority sentiment, which includes actions from anarchists, militia, or sovereign citizen extremists.
3) **Animal Rights/Environmental Extremism** – violent acts or threats derived to further a political or social agenda related to animal cruelty, harm, or exploitation of animals and/or destruction of natural resources or the environment.
4) **Abortion-Related Violent Extremism** – violent acts or threats related to political or social agendas relating to abortion, whether that position be one of support or opposition to the practice.
5) **Other Domestic Terrorism Threats** – violent acts or threats derived from other agendas that may include personal grievances, political concerns, conspiracy theories or sexual orientation (DHS and FBI, 2022).

The NDSLIC mission is “to gather, store, analyze and disseminate information on crimes, both real and suspected, to the law enforcement community, government officials and private industry concerning dangerous drugs, fraud, organized crime, terrorism and other criminal activity for the purposes of decision making, public safety and proactive law enforcement while ensuring the rights and privacy of citizens” (NDSLIC, 2023). Serving as a knowledge and communications agent for the public and government agencies around terrorism incidents is part of its responsibility (DHS, 2023). As part of that role, it disseminates bulletins from the National Terrorism Advisory System, which is used by the Department of Homeland Security to make the public aware of the risk for terrorism.

A nation-state attack is an attack that originates from a foreign government. These may be cyber in nature, and such a cyber-attack is discussed in Section 4.4 Cyber Attacks (FBI 2023). Similar to terrorism attacks, the goal of a nation-state attack is politically coercive in nature in that such an attack would be to force action or inaction by the federal government through an act of violence or targeted attack. In the event of a nation-state attack impacting the state of North Dakota, the United States military would be the lead agency in the event of an armed incursion. If the attack comes in the form of cyber, espionage, assassination, etc. the FBI will be the lead agency.

4.13.1.2 Previous Occurrences

The following section describes notable and recent events of terrorism in the state of North Dakota.

- Between 2018 and 2022, the NDSLIC reported 10 Terrorism Screening Center encounters, locations shown in **Figure 4.13-1**. Most of these occurred at airports where individuals were either flying into or out of the state, and others came from local law enforcement contacts (NDSLIC, 2023).
- Between 2018 and 2023, there were 27 reports of a possible nexus to terrorism sent from the NDSLIC to the FBI, which are currently within the FBI's jurisdiction (NDSLIC, 2023).

Figure 4.13-1: Terrorist Screening Center Encounters, 2018-2022

County	Encounters
Cass	3
Ramsey	1
Ward	1
Stark	1
Burleigh	1
Pembina	1
Williams	1
Unknown	1

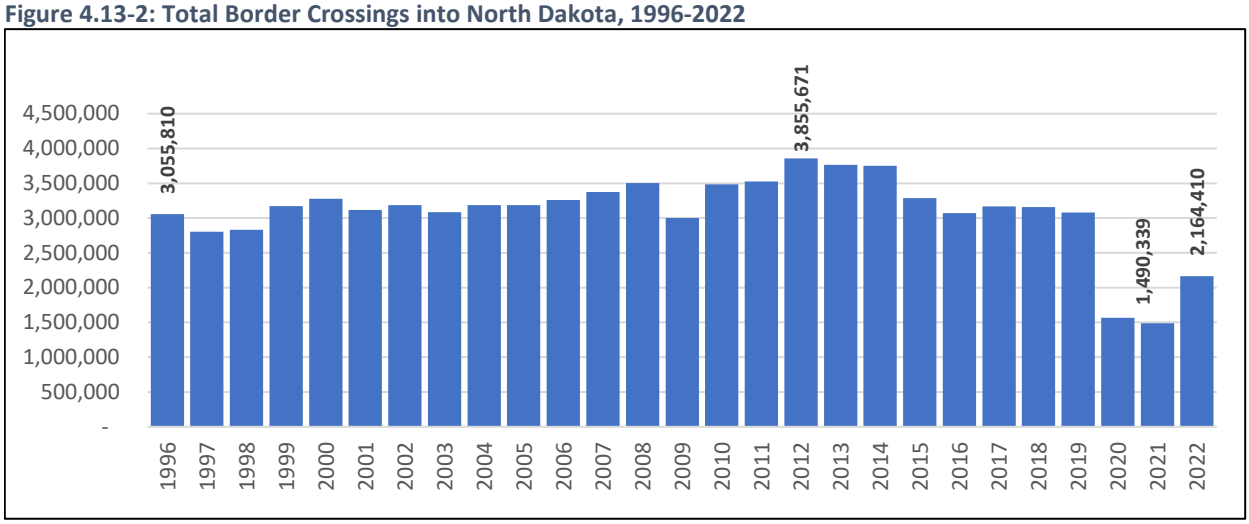
Source: NDSLIC, 2023

4.13.1.3 Location and Extent

For a nation-state attack, American military targets, federal buildings, and targets that could impact the national economy would be the likely targets of any nation-state attack in the state. In North Dakota, these would be high-value oil or agricultural targets.

Figure 4.13-2 shows annual border crossings into North Dakota from Canada. Border crossings into the state have decreased significantly in recent years, primarily due to COVID-19 restrictions, though they have been in slow decline since reaching a peak of 3,855,671 in 2012.

Figure 4.13-2: Total Border Crossings into North Dakota, 1996-2022



Source: Bureau of Transportation Statistics, 2023

Activity related to international terrorism or foreign terrorist organizations is more likely to occur at border ports of entry, at airports or on airplanes, in areas with large, dense populations or at large public gatherings (NDSLIC, 2023). Lone offenders will likely act in areas with a dense population if not selecting a target with personal meaning.

Every ground port of entry in North Dakota experienced a decline in crossings since 2018, as shown in **Figure 4.13-3**. Decreases ranged from 8.5 percent at Ambrose to 71.3 percent in Westhope, with an average decrease of 36.5 percent across the state. Pembina was the busiest portal since 1996 with 37,856,878 total crossings. COVID-19 related border closures are likely a significant part of the decrease of crossings in 2020 and 2021.

The presence of pipelines, the oil industry, and the livestock industry provide possible options for targeted attacks by environmental extremists. Figure 2.55 in the Background Chapter shows pipeline locations. As of 2021, the EPA recognizes 90 Concentrated Animal Feeding Operations (CAFOs) in North Dakota that could become targets for animal rights extremists.

Areas with diverse populations and facilities where groups of common identities congregate, including places of worship, may lead to targeted violence, like occurred in Fargo in 2022.

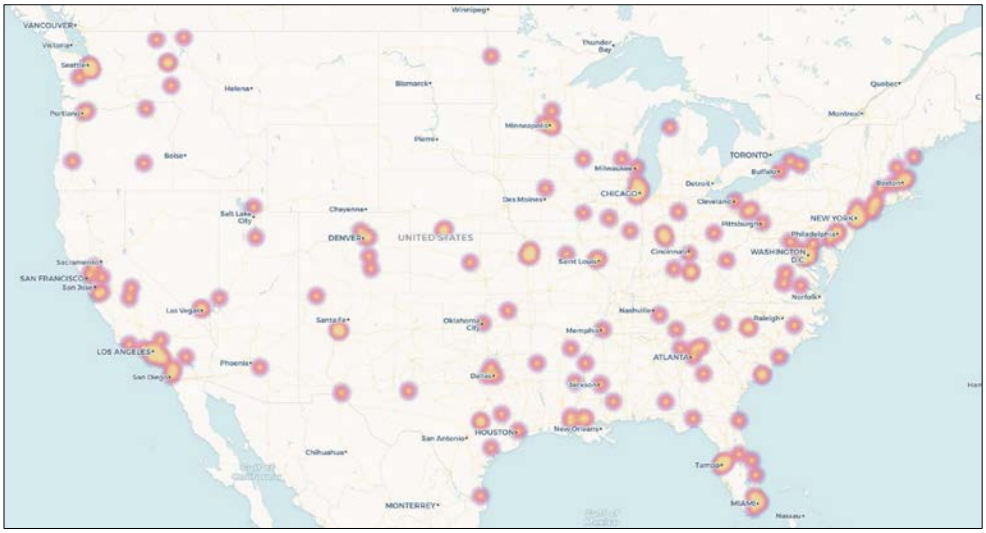
Figure 4.13-3: Highest Portal Declines, 2018-2022

Location	Decrease
Westhope	-71.3%
Carbury	-64.1%
Walhalla	-63.2%
Neche	-48.5%
Northgate	-43.7%
Sarles	-43.1%
Sherwood	-41.8%
Noonan	-39.7%
Antler	-37.4%
Fortuna	-34.1%
Pembina	-33.9%
St John	-30.2%
Maida	-27.5%
Hansboro	-25.0%
Dunseith	-19.8%
Portal	-15.0%
Hannah	-10.3%
Ambrose	-8.5%
Average Change	-36.5%

Source: Bureau of Transportation Statistics, 2023

Locations providing abortion or other reproductive services could be targets of concern for abortion-related extremism, both pro-life and pro-choice, according to FBI definitions (FBI, 2020). Abortion is completely banned in North Dakota with very limited exceptions, effective April 24, 2023, with no reported abortion-related incidents reported prior to criminalization.

Figure 4.13-4: Right-Wing Attacks and Plots in the Contiguous United States, 2014-2020



Source: Jones et al, 2020

Figure 4.13-5 provides an overview of the spatial extent for terrorist or nation-state attacks.

Figure 4.15-5: Spatial Extent for Terrorist or Nation-State Attacks in North Dakota

Resource	Extent
Public	Statewide
First Responders	Statewide
Delivery of Service and Continuity of Operations	Limited
Property, Facilities, and Infrastructure	Limited
Environment	Limited
State Economy	Statewide

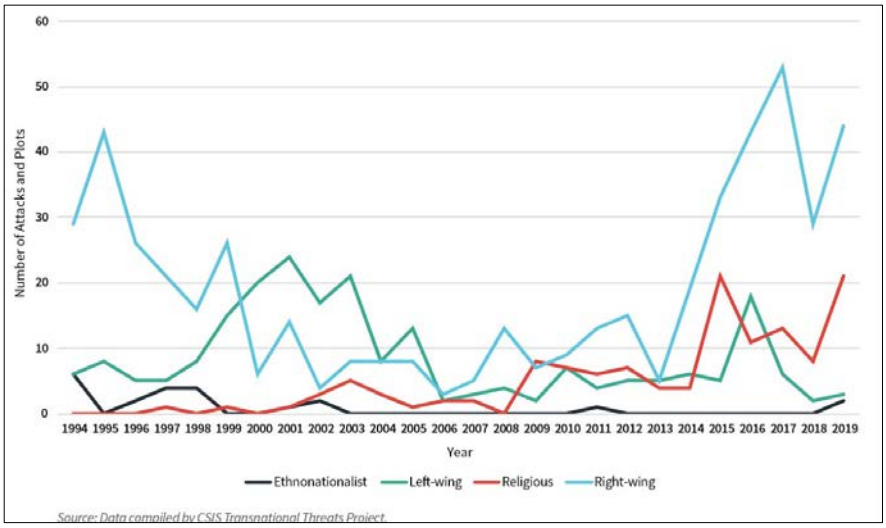
4.13.1.4 Probability

With North Dakota being centrally located in the continent and its rural nature. Home grown or domestic violent extremism are the primary threats facing North Dakota, unlikely from a foreign terrorist organization (FTO). Since the last plan, there have been seven new FTOs listed by the State Department, and seven removed from the list during the same period. While the agricultural and oil industries may continue to draw acts of vandalism, the primary risk of terrorism comes from FTOs and domestic violent extremists (DVEs).

Data from the NDSLIC indicates that encounters/interactions of concern with the FBI's Terrorism Screening Center have dropped dramatically since the last mitigation plan update (NDSLIC, 2023). The last plan reported 43 encounters during its five-year data period, while just 10 occurred during the four-year period applicable to this plan, for an average of two encounters per year. This was a welcomed decrease in incidents. Suspicious Activity Reports (SARs) have also been less frequent since the previous plan update. After reporting 266 SARs between 2014 and 2017, those have dropped to 12 between 2018 and 2022.

The Center for Strategic & International Studies (CSIS) examined the risk of terrorism in the United States and noted that there are shifting origins and targets. There are an increasing number of right-wing attacks in the nation, while attacks on religious groups are also increasing (Jones, Doxsee, & Harrington, 2020), as shown in **Figure 4.13-6**.

Figure 4.13-6: Terrorist Attacks and Plots by Perpetrator Orientation, 1994-2019



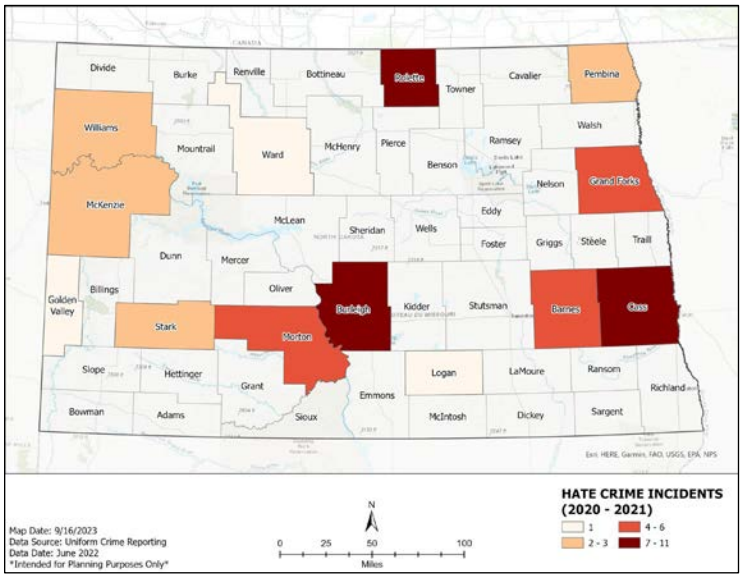
Source: Jones et al, 2020

Hate crimes began to be reported as part of Uniform Crime Reporting maintained by the Bureau of Justice Statistics in 2020. **Figure 4.13-7** shows the geographic distribution of hate crimes, showing that 13 of the state's 53 counties reported a hate crime in the two-year period. Cass (11), Rolette (11), and Burleigh (10) accounted for more than half.

The Anti-Defamation League (ADL)* track data related to Hate, Extremism, Antisemitism and Terrorism (HEAT). This dataset is formed using information from police reports, news and media reports, government documents, victim reports, and Center on Extremism investigations and can include vandalism and aggressive propaganda. In North Dakota, 23 communities experienced incidents that qualified for the HEAT map, and 10 of those communities had less than 1,000 residents (*ADL, 2023). However, most incidents (40) occurred in Fargo, as shown in **Figure 4.13-8**, during the 6-year period, 2018 through 2023.

Sixty-three incidents were related to white supremacist propaganda, as shown in Figure 4.13-9. And According to the (*ADL, 2023), as political tension evolves, hate crimes may become more prevalent, and the probability of a terrorist or nation state attack taking place will likely increase.

Figure 4.13-7: North Dakota Hate Crimes by County, 2020-21



Source: Uniform Crime Reporting, 2022

Figure 4.13-8: Communities with 2 or more ADL HEAT Incidents, 2018-2023

Location	Incidents
Fargo	40
Bismarck	9
West Fargo	3
Grand Forks	2
Harwood	2
Horace	2
Kindred	2
Wahpeton	2
Grand Total	77

*Source: *Anti-Defamation League, 2023*

Figure 4.13-9: ADL HEAT Incidents by Type, 2018-2023

Type of Event	Incidents
White Supremacist Propaganda	63
Antisemitic Harassment and White Supremacist Propaganda	5
Antisemitic Vandalism and White Supremacist Propaganda	4
Antisemitic Harassment	2
Antisemitic Vandalism	2
White Supremacist Event	1

*Source: *Anti-Defamation League, 2023*

*** The ADL is a private organization; whereas their definitions, characterizations, classifications, and reports have been established using their criteria and terms, which may not align with the U.S. Government's Code (USC) and laws.**

4.13.1.5 Warning Time and Duration

Both terrorist and nation-state attackers are unlikely to give warning for law enforcement to act in a manner to thwart the attack. However, law enforcement activities and reporting of suspicious activity by the public can identify indicators of terrorist plans allowing intervention that stops violence. The duration of most attacks is brief, as the goal is typically to enact the most violence before law enforcement can respond.

During an outreach effort lead by NDDES with the LGBTQ2S+ community, group members identified concerns related to a criminal act of terrorism or a mass shooting incident due to the historical acts of targeted violence across the country. Individuals expressed concern for the safety of their community and the risk factors intertwined into laws related to healthcare access. This shows the gap in equity when factoring in the whole community.

4.13.2 Consequence and Vulnerability Loss Analysis

This section describes the consequences and vulnerabilities of a terrorist or nation-state attack.

A consequence is the "degree of debilitating impact that would be caused by the incapacity or destruction of critical infrastructure or a critical function" (FEMA, 2021). Consequences can be tangible impacts to buildings or systems or intangible impacts on processes, business, or reputation. Consequences include debilitating impacts, such as the loss of critical functions, data, or public confidence (FEMA EMI, 2023). It also includes cascading effects that may have an effect on functionality of critical services such as the loss of service of a utility or communications.

Vulnerability is "susceptibility to physical injury, harm, damage, or economic loss." It considers the extent of injury and damages that may result from a hazard event of a given intensity in a given area (FEMA EMI, 2023). This may be a geographic, social, or economic feature that makes harm from a hazard more likely or more intense.

4.13.2.1 Human Loss

In many terror or nation-state attacks, the public has been the main target with the goal to enact enough violence to influence social or political behavior. Many terror attacks are violent criminal attacks on other people, either for the point of doing the most harm or targeting a particular group of people that the actor wants to change or cause to leave. Hostage scenarios are also a tactic that terrorists have historically used, which may end in violence for the victims and create lasting trauma.

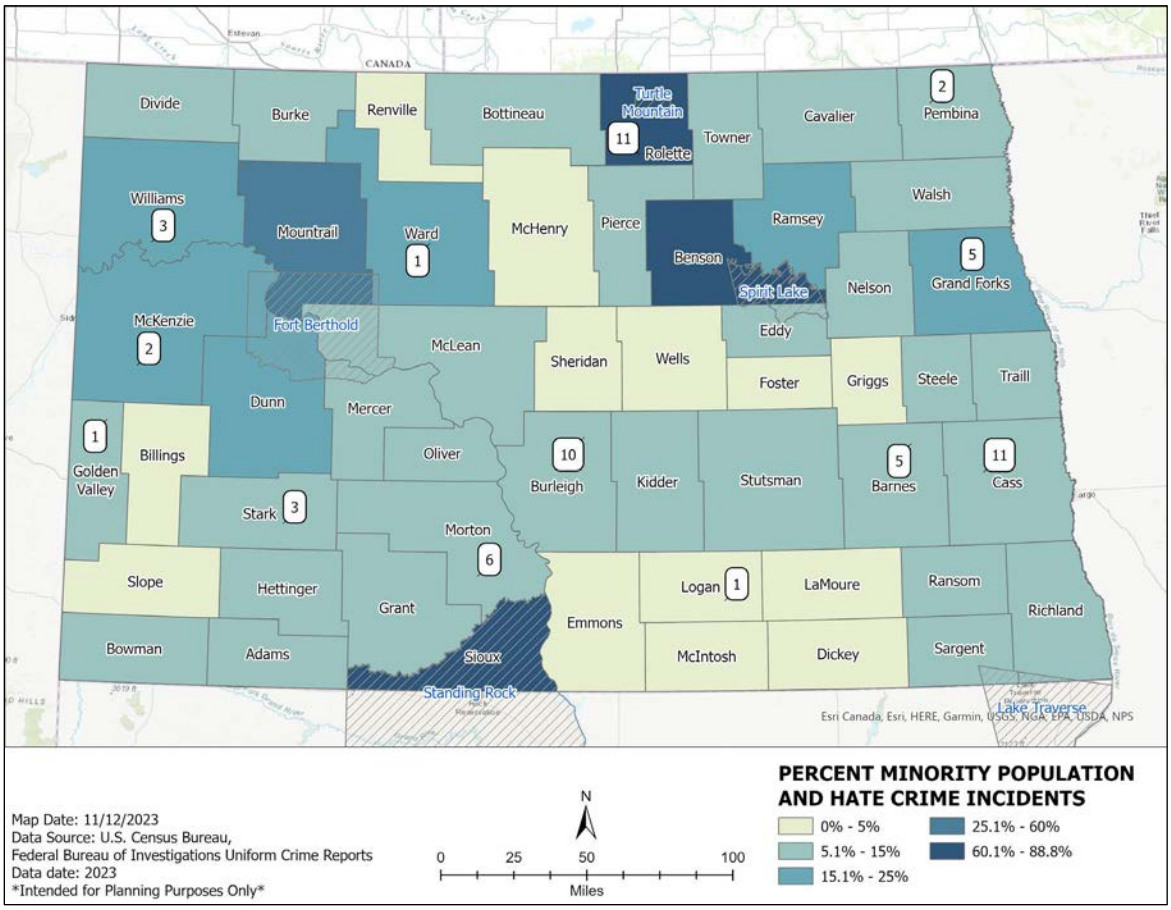
Attacks can have impacts on members of the public who were not directly impacted. Fear and trauma can impact the lives, mental, and physical health of members of the public not involved in the attack due to stress and fear of a repeat or similar attack.

Propaganda and vandalism can also create trauma and fear, and breed hostility within communities where it is occurring. Often, that is the goal of the actions.

Adversarial attacks typically view humans as primary targets. Socially vulnerable groups are most at risk of harm from these attacks. For attacks aimed at creating quick violence, vulnerable groups like children,

the elderly, and the disabled may be least capable of defending themselves or evacuating to safety. Socially vulnerable ethnic and racial populations are the most likely targets for hate crimes and terrorist activity and attacks. **Figure 4.13-10** shows the number of hate crimes (UCR, 2023) and the percentage of the population that identifies as a racial minority (ACS, 2023). Rolette County had the most racially

Figure 4.13-10: Percent Racial Minority and Hate Crimes



Source: U.S. Census Bureau, 2023

related crimes and is a majority-minority area (U.S. Census Bureau, 2023). Attacks may increase barriers or highlight needs in underserved populations.

4.13.2.2 First Responders

First responders are often placed in the line of fire when responding to terrorist or nation-state attacks. They may enter the scene before the motivation of the violent act is clear and when there is still violence. They may enter a scene to provide aid while violence is still ongoing or may be called in to negotiate an end to the violence.

Similar to the public, these events can have trauma, fear, or stress responses not just on first responders involved in the event, but from others who fear a similar attack. It may also have grief impacts on these tight occupational units.

4.13.2.3 Environmental, Natural, and Cultural Resources

There are times when environmental, natural, or cultural resources are harmed indirectly by attacks. While the May 2023 substation attack in Ray did not lead to environmental harm, a September 2021 shooting of electrical infrastructure in Mandan caused outages, an explosion, and an oil spill, impacting the nearby environment.

Conversely, there are times when the symbolic value of the environmental, natural, or cultural resource is the motivation for the attack occurring where it does. Tribal lands and resources, religious institutions, and other locations that hold value to cultural and ethnic groups targeted for hate are often the target for criminal activity. The Chabad Center in Fargo was the target for antisemitic vandalism on Yom Kippur, a Jewish holiday, in September 2021 (*ADL, 2023). According to Hagen and Morris (2022), cultural targets are typically selected for their cultural importance or for catering to targeted groups, as was the case with recent crimes targeting the International Marketplace in Fargo, discussed in Section 14, Civil Disturbance Hazard.

4.13.2.4 Property, Facilities, and Infrastructure Damage

Vandalism can be intended to intimidate or send a message and often brings damage to property, facilities, and infrastructure. The September 11, 2001, attacks on the World Trade Center and Pentagon resulted in substantial damage to property, facilities, and infrastructure.

Locations that serve as gathering points may also be targets for attacks that seek to enact as much violence as possible prior to law enforcement intervention.

Property damage with hateful language or political messages are often an indicator of future attacks. Property owned or catering to groups targeted by hate crimes are especially vulnerable to property damage from extremist groups. Vandalism can leave lasting impressions on the community and may require restoration of the property such as painting over or repairing the damage.

Opportunities for attacks to property, facilities, and infrastructure occur where facilities and infrastructure are in remote locations. Pipelines targeted by environmental extremists and electrical substations are examples where agents have acted upon these facilities in remote areas because there were fewer people to witness their actions.

4.13.2.5 Critical Facilities, Community Lifelines, and State Assets

Community and critical facilities can be targets of terrorist, nation state, and or extremist activity. Energy and electrical infrastructure have been the focus of several recent North Dakota criminal activities. These critical structures are often unattended and located far from first responders, especially in North Dakota, and can provide enticing targets for would-be attackers. Gathering places or locations of symbolic value, such as state capitols or federal buildings, can be targets of attacks to make a political statement.

Some key vulnerabilities are present among critical facilities, community lifelines, and state assets. The rural nature of North Dakota leaves facilities such as pipelines and electric substations largely

unattended and vulnerable. The agriculture and oil and gas industry in the state places flammable and hazardous materials in large volumes, in isolated, lightly guarded facilities.

Every state is federally mandated to use placards designating the threat posed by the chemical. Ammonium nitrate can be used to build explosives, whereas anhydrous ammonia is viewed as a threat from its inhalation toxicity.

The rural nature of North Dakota also places community lifelines such as medical care in a vulnerable position in the event of a mass-casualty event. Hospitals may be far from the incident or may lack the capacity to treat victims of an attack, necessitating life flights and long ambulance rides. There is often limited capacity to move patients to other hospitals.

Figure 4.13-11: Anhydrous Ammonia Tank in ND

Source: NDAG, 2019

4.13.2.6 State Economy and Economic Disruption

Attacks on infrastructure can impact the economy as well; when power outages occur, businesses in the area cannot open, which can impact all businesses in an area. Local businesses can also be impacted by an event because people no longer feel safe engaging in regular economic and social activities.

Similarly, FTOs or other terrorists may target fertilizer supplies on agricultural facilities for use in explosives.

4.13.2.7 Delivery of Service and Continuity of Operations

Some attacks have the goal of impacting the delivery of service and continuity of operations, especially attacks by extremist, terrorists, and nation-state attacks. National examples include the 1995 Oklahoma City bombing of the Alfred P. Murrah Federal Building, which killed 168 people and was perpetrated by anti-government terrorists acting in protest to the federal government (History.com, 2023). While not successful in its political aims, the continuity of operations in the city was temporarily disrupted.

Unless it is a direct target, the state is unlikely to have a direct impact from an adversarial attack and has no particular vulnerability. With the increase of remote work, vulnerabilities and disruptions that may have existed previously will largely be overcome more quickly. Even in the event that a school or university is targeted and damaged, the COVID-19 experience has made government institutions and the recipients of their services more familiar with online approaches.

Figure 4.13-12: Computers in the Classroom Make Government Services More Accessible

Source: North Dakota Department of Public Instruction

4.13.2.8 Public Confidence in the State's Governance

Public confidence in the state's governance can take a significant blow among targeted attacks. Minority racial and ethnic communities can feel that law enforcement is unwilling or unable to protect them from harm. Often members of the targeted community are quick to point out how policy or government action could play a larger role in their safety. After the 2022 attacks in Fargo and West Fargo, local business owner and activist Faith Dixon-Shields quickly addressed the role in government in the minority community's safety against hate groups or Domestic Violence Extremists (DVEs).

Fear that the police cannot successfully protect the public due to various reasons can lead to vigilante justice or retaliatory action within these communities in addition to public expressions of frustration with the lack of actions taken.

The communities most likely to be targeted activity and attacks are often those who already have negative experiences or prejudices about government officials and policy; they are often those most vulnerable during other events; and they are often the least likely to reach out to the government for help for other reasons.

Figure 4.13-13: Renville County Sheriff's Office

Source: Renville County, 2023

4.13.2.9 Estimation of Annual Losses

The cost of counterterrorism in the state would be difficult to track as many physical targets are private and the emotional damage occurring from the trauma of being a target would vary by individual.

4.13.2.10 Community Resilience

While the rural nature of North Dakota creates opportunities for attacks, it also provides an essential role in resilience. There are many dimensions of resilience that rural communities struggle with such as accessing resources, enforcing zoning, supporting community lifelines, and creating rainy-day funds to help recover from weather disasters. However, rural communities thrive due to stronger social capital, experience with self-reliance, a sense of identity, and a history of community member reciprocity (Jerolleman, 2021). In much of North Dakota, everyone knows each other and therefore it is difficult for a stranger to be involved in malicious activities without drawing attention.

4.13.2.11 Future Conditions

This section evaluates how changes in existing conditions may impact terrorist or nation state threats and the risks that they pose. FEMA (Attacks, 2023) defines an attack as a hostile action taken against the United States by foreign forces or terrorists, resulting in the destruction of or damage to military targets, injury or death to the civilian population, or damage or destruction to public and private property.

4.13.2.11.1 Extreme Climate Variability and Climate Change

Through the end of this century, North Dakota's natural yet extreme climate variability will likely continue to be the primary influencer or signal within each natural hazard (Frankson, 2022). This may directly or indirectly impact jurisdictions and peoples across the state, over days to decades long timescales, while the much more subtle and gradual trends of climate change over the rest of this century may act to further extend the range of such variability (Knapp, 2023). Such studies show, both trend and variability could extend beyond that which has previously been documented in the historical record. Recent climate change trends have shown, and future projections suggest that the state can expect continued gradual warming in all seasons, with the greatest warming in the winter season. Overall precipitation is likely to increase, but with a high degree of inter-seasonal and interannual variability, which could lead to longer and stronger droughts interspersed with more frequent and more intense flooding (Swain, 2015). Severe summer and winter season storms will likely continue to occur in both drier, drought-prone periods, and wetter, flood-prone periods within the state's overall extreme climate variability.

While there is no direct link between terrorism and climate change, there is a relationship between the two that allows actors to exploit the effects of climate change. The presence of persisting ecological issues is considered to be a threat multiplier in conflict zones such a Somalia, the Sahel (Mali and Nigeria), and the Middle East (Syria and Pakistan) among the most unstable (IEP, 2023). In a 2021 UN Security Council Report, Malta's Ambassador Vanessa Frazier referred to papers presented at the 26th UN Climate Change Conference in Glasgow (COP26), earlier that year, stating that "terrorist activity, especially in the Sahel region, can also be linked to climatic factors, which can adversely impact natural

resources through floods or droughts, thereby exacerbating competition over dwindling resources, often leading to unrest and eventually a vacuum for terrorist groups to exploit" (UNSEC, 2021).

Similar to Civil Disturbance, most Terrorism results from societal reasons such as economic hardship, social injustices, ethnic differences with long-standing oppression by a group of people towards another, objections to world organizations or certain governments, political grievances, and terrorist acts (USAR_2005). Future climate projections through the end of the century do indicate the potential for increased societal insecurities and instabilities (Hoegh-Guldberg, 2018), including places like the Northern Great Plains (NGP) region.

4.13.2.11.1.1 Impact

Within the state, the direct physical or ecological impacts from our extreme climate variability, current climate trend, or climate change projections *are not expected* to have a corresponding primary or direct cause/effect relationship to Terrorist or Nation-State Attack, much like Civil Disturbance, based on global analyses (Benjaminsen, 2016). But there may be secondary or indirect effects on certain regions similar to the Middle East and North Africa, where climate change may trigger, accelerate, and deepen existing civil or personal instabilities (Sofuoğlu, 2020; IEP, 2023), and perhaps the NGP region as well.

4.13.2.11.1.2 Adaptation

There are no expected direct impacts expected by climate change on Terrorist or Nation-State activities in the NGP region, so there are no specific adaptation actions at this time other than those already suggested as part of other hazards.

4.13.2.11.1.3 Mitigation

There are no expected direct impacts expected by climate change on Terrorist or Nation-State activities in the NGP region, so there are no specific mitigation actions at this time other than those already suggested as part of other hazards.

4.13.2.11.2 Other Changes

From a national security standpoint, climate change may be a threat capable of multiplying and aggravating already existing problems (water shortages, droughts, etc.) as well as generating fertile ground for future personal and nation-state security threats (IEP, 2023). According to Causevic (2017), and as discussed in Section 3, the cascading ecological effects of climate change could result in a decreased ability for families to provide for themselves, increasing refugee and migration flows, and acting as a catalyst for the increased spread of diseases.

Researchers have also found that increased geopolitical risk and corruption, whether enhanced by climate change or not, can in turn lead to increased CO^2 emissions in those affected regions (Anser, 2021; Chu, 2023). This may lead to a feedback loop for further global instability unless policies are enacted to reduce the growth of shadow economies and their effects on geopolitical uncertainty.

The list of organizations that the FBI, ADL, or SPLC identify as extremist changes regularly, as do the threats posed to the public. Cultural, political, and demographic shifts can newly disgruntle a person who might enact violence on their beliefs. Access to information and like-minded people through the internet, and the proliferation of propaganda, conspiracy theories, and provocations through the

internet can help generate local violence before law enforcement understands the threat. Technology, demographic change, and national politics are not something that state and local responders can control but will likely shape the nature and motivation of future activities and attacks. Given growing international geopolitical hostilities, the presence of military bases in Minot, ND and Grand Forks, ND and presence of missiles or the perceived presence of such may make North Dakota a target.

Areas with large numbers of people provide more targets and damage for terrorist and nation-state attacks. The urban areas of the state are anticipated to have a 24.6 percent growth rate between 2020 and 2040 (U.S. Census Bureau, 2020). Areas in and near Fargo, ND, Grand Forks, ND, Bismarck, ND, and Williston, ND will see more people and events, making these areas more appealing targets.

4.13.3 Risk Analysis

Risk can be defined as the potential for loss of or damage to an asset (FEMA EMI, 2023). This section analyzed the potential for loss or damage in the state of North Dakota.

4.13.3.1 National Risk Index

The National Risk Index does not evaluate this hazard.

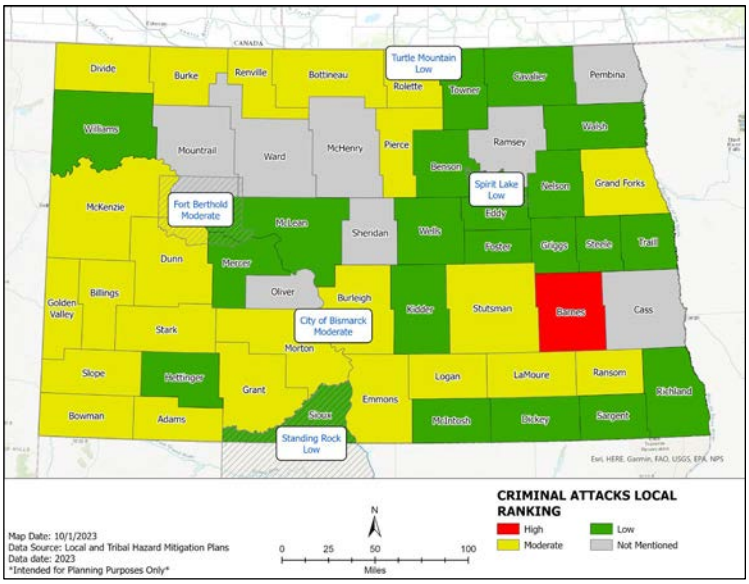
4.13.3.2 Risk Index Score

The Priority Risk Index for this plan update ranks Terrorist, or Nation-State Attack as a low risk with a score of 1.9. This ranks the same as geologic hazards for the highest Low-Risk hazard, ranking it tied for 12th out of 15 hazards.

4.13.3.3 *Jurisdictions at Risk*

When evaluating local and tribal mitigation plans, 50 of 58 jurisdictions with adopted plans identify criminal, terrorist, or nation-state attacks as a hazard impacting their jurisdiction, as shown in **Figure 4.13-14**. This is the first time the state has separated criminal attacks into a stand-alone hazard. Of all plans that ranked hazards, 24 considered it a low risk. According to the Barnes County, ND Multi-Jurisdictional Multi-Hazard Mitigation Plan (2015) it is the only county that identifies criminal, terrorist, or nation-state attacks to be a high risk.

Figure 4.13-14: Local and Tribal Hazard Mitigation Plans Rating Adversarial Attacks



Source: Local and Tribal HMPs, 2023

4.13.4 Summary/Conclusion

The following bullets summarize highlights and conclusions related to terrorist or nation-state attacks.

The presence of the oil industry and animal agricultural industry provide strategic targets in the state for hostile nations, terrorists, extremists, respectively. The remote location of energy, agriculture and electric infrastructure provide enticing targets for targeted attacks.

- Encounters at the Terrorism Screening Center and Suspicious Activity Reports are both down since the previous plan update.
- Hate crimes became part of uniform crime reporting in 2020. North Dakota experienced a significant increase in activity in 2021 over 2020, although limited data makes it unclear which year was unusual.
- Members of the public and first responders can be primary victims of attacks but can also suffer from trauma and fear that impact their lives and productivity.
- Most of the drivers of terrorist and nation-state activity are out of the state's control.
- Victimized groups often express distrust or a lack of confidence in the government's ability to protect them from those who mean them harm.

4.13.5 Data Limitations

Much of the data that can give the clearest picture of probable risk and consequences or that could identify targets is appropriately unavailable for analysis. The exact likelihood of North Dakota falling victim to a nation-state attack, and the actions taken by law enforcement to infiltrate or thwart terror

attacks is privately held so as not to interfere with ongoing law enforcement activities or to disclose methods and leads.

4.14 Civil Disturbance

4.14.1 Overview

This section examines the risks posed by a significant civil disturbance that warrants the state to deploy resources to supplement local and tribal capabilities in North Dakota. This hazard may have overlaps with terrorism and/or crime, thus sections 4.4, 4.10, and 4.13 should also be evaluated to understand the whole risk profile.

Figure 4.14-1: Man Jumping Over Bonfire During Zip to Zap, 1969

Source: Shemorry Collection, SHSND, 1969

4.14.1.1 Description

FEMA defines a civil disturbance as "civil disturbance activity, such as a demonstration, riot, or strike that disrupts a community and requires intervention to maintain public safety" (FEMA, 2023). For this plan the need to activate state or federal resources is also required. Most civil disturbances are local in scale and are within the capability and responsibility of local law enforcement to address. For more information on such events, consult the relevant local and/or tribal plans, which are considered unattached appendices to this state plan update. The source of a civil disturbance may dictate what state agencies may become involved in a response and when they are likely to be brought in. State Highway Patrol and the National Guard are the groups most commonly requested to assist in the restoration of peace. Mutual Aid agreements between local law enforcement agencies may bring in resources from one jurisdiction to assist another.

4.14.1.2 Previous Occurrences

- In 1969, a North Dakota State University (NDSU) student advertised his spring break plans to "Zip to Zap," in the university newspaper since he lacked the funds to go to Florida. Zap was at the time and remains a community of fewer than 300 people in Mercer County. The article was picked up and disseminated by The Associated Press (Schramm, 2019). Initially the community welcomed the national attention, and it was promoted as the "Grand Festival of Light and Love," and nearby farmers gave permission for camping in their fields. On May 9, 1969, about 2,500 college students arrived to hear regional bands and engage in the traditional college spring break drinking and mischief (Johnson, 1979). The two local bars ran out of alcohol, causing the festive atmosphere to shift, and descend into mayhem. Local police asked the revelers to disperse, but many did not.

  The governor called in the State Highway Patrol and 500 National Guard troops to quell the riot and disperse the revelers who had caused $25,000 in property damage (Weiser-Wilson, 2012).

The community sent the bill for damages to the University of North Dakota (UND) and NDSU student governments, which raised money to pay them.

- In 2016, North Dakota's most nationally recognized civil disturbance event involved controversy over the Dakota Access Pipeline (DAPL) (Johnson, 2016). While the pipeline was intended to connect the Bakken Oil Fields to Gulf Coast refineries (Hersher, 2017), protesters sought to protect sacred burial grounds and the Standing Rock Reservation's water supply.

Figure 4.14-2: Dakota Access Pipeline civil disturbance, November 2016

Source: Morton County Sheriff's Department, 2016

On April 22, 2016, the U.S. Army Corps of Engineers approved the footprint of DAPL while also acknowledging that there are five recorded cultural sites in the area, and that the Standing Rock had requested additional archaeological surveys (Hersher, 2017). In June, the federal government's Advisory Council on Historic Preservation rejected the Corps' determination of no impact to historical sites. A month later, the route was approved with assurances that outstanding comments and disputes had been resolved. A week later the Standing Rock sued the Corps for failing to adequately consult the Tribe and violating the National Historic Preservation Act, and a civil disturbance began.

By June of 2016, Energy Transfer Partners (ETP) countersued the Standing Rock Tribe for halting construction activities. On August 10, 2016, private security and participants clashed violently for the first time, and the protest went from a peaceful civil disturbance to unlawful assembly. Construction was halted by the courts on September 6, 2016 (Hersher, 2017). Two days later, the state activated 500 National Guard troops to assist local law enforcement). The next day, the courts reversed their decision to halt construction noting that "the United States' relationship with the Indian tribes has been contentious and tragic," the Corps had complied with its legal obligation, and the tribe had failed to prove that it would suffer injury from the construction.

In response, the U.S. Departments of Justice, Interior, and the Army requested that construction remain idled pending further consultation with the Standing Rock tribe. However, construction proceeded despite the request. The demonstration continued and 27 people were arrested (Hersher, 2017). In November, the Obama administration said it was studying alternate routes, but later that month, the standoff between participants and law enforcement and ETP reached its peak. From August 2016 to March 2017, Morton County Sheriff's Office reported that participants engaged in violent acts including the deployment of improvised explosive devices; killing and taking of cattle, deer and buffalo; use of weapons and wasp spray; throwing of incendiary devices, frozen water bottles, rocks, and other heavy items; the intentional ignition of

wildfires and vehicle fires; and setting off of buffalo stampedes (Morton County Multi-Jurisdictional Hazard Mitigation Plan, 2020). November 20, an incident on the bridge that spans Highway 1806 took place between law enforcement and participants over a blockage caused by a burned vehicle. During the incident, several individuals (participants, law enforcement, and National Guard) were injured and required medical care (Hersher, 2017). Shortly after taking office, President Trump signed an executive memo requiring the U.S. Army Corps of Engineers to expedite construction, which began promptly thereafter.

North Dakota Governor Doug Burgum set February 22, 2017, as the deadline for participants to leave the site, at which point remaining participants were arrested and removed from the site. State contractors had removed 48 million pounds of trash by March 2017 (Richardson, 2017). Morton County suffered $40 million in costs for law enforcement, infrastructure repair, clean-up, and prosecutions. A lawsuit filed by ETP against Greenpeace for promoting the incident (Brady, 2018), and by the Standing Rock Tribe against the state for shutting down the local highway near the area of civil disturbance that impacted business at the Prairie Knights Casino and income for the Tribe.

- On May 30, 2020, peaceful demonstrations in Fargo in response to the George Floyd case in Minnesota turned violent with sunset. Individuals began to taunt police by throwing water bottles, smashing windows of local businesses, damaging vehicles, and setting a bonfire downtown. In response to the criminal actions, police deployed tear gas, and the mayor and governor declared emergencies (Associated Press, 2020). Two officers were trapped in a squad car while the windows were smashed; the local police chief largely blamed out-of-town visitors, whom he believed hijacked the event. In total 18 people were arrested, four law enforcement officers were injured, and three police cars were destroyed. Additionally, there was damage to downtown Fargo businesses, including broken windows and graffiti. The City of Fargo estimated that the civil disturbance resulted in about $842,000 in damages (Olson, 2020). At this time there were also protests and marches on the NDSU campus that impacted the university and students at the time.
- In February 2022, an estimated 50 semi-trucks and assorted farm equipment, dubbed the “Freedom Convoy”, blocked the United States-Canada ports of entry at Pembina and Neche (Baker, 2022) in protest of Canadian requirements that incoming truckers have proof of COVID-19 vaccination, followed by an American law requiring the same (Newton, et. al, 2022). The Ottawa protests resulted in at least 25 arrests and 500 tickets, all of which occurred in Canada (KXNews, 2022). In this instance, it was Canada’s national resources, not the state’s resources that were deployed to end the blockade. The only impact in North Dakota from this event was traffic moving slower at the Pembina and Neche Ports of Entry (POE).
- Fargo’s Islamic Cemetery was subject to vandalism in 2022 when five vaults had been badly damaged or smashed open (McGurren, 2022). In 2022, a mural at the International Market Plaza in Fargo had to be removed after its second vandalism incident, leading to two groups suing the white nationalist groups alleging violation of the Ku Klux Klan Act, stating that the vandalism of these resources deprived diverse residents of their Constitutional rights (Hagen and Morris, 2022). In addition to ruining art and a wall, shown in **Figure 4.14-3**, Immigrant Development

Figure 4.14-3: White nationalist graffiti on Fargo Immigrant Mural

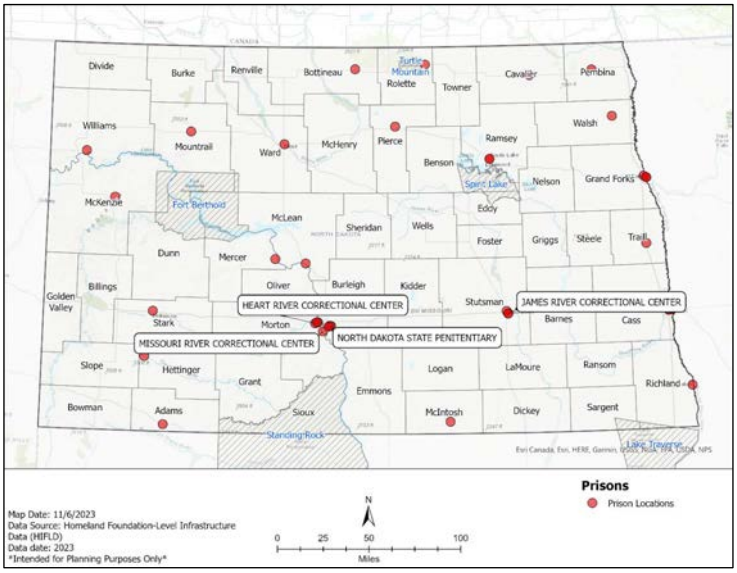
Source: C.S Hagen, Fargo Forum, 2022. Reprinted with permission.

Center Executive Director, Fowzia Adde, shown in the photo said there was a second round of economic harm beyond cleaning up hate messages.

4.14.1.3 Location and Extent

According to 18 USC 232, The term "civil disturbance" means “any public disturbance involving acts of violence by assemblages of three or more persons, which causes an immediate danger of or results in damage or injury to the property or person of any other individual.” While any location can become the scene of a civil disturbance, areas where larger crowds or groups of people may gather, such as landmarks or universities, may present a greater risk. Potential locations for civil disturbancedisturbance include areas where large crowds are present, such as the State Fair, landmarks and critical infrastructure, courthouses, the state capitol, and prisons. Due to the nature of the population, prison facilities have historically, both in and out of the state, been sites of civil disturbances, (Associated Press, 2019). These locations may be more likely to instigate a civil disturbance event compared to other congregational living. According to the North Dakota Department of Corrections and Rehabilitation (2020), the following are state prisons as shown in **Figure 4.14-4**.

Figure 4.14-4: Prison Locations



Source: Homeland Foundation-Level Infrastructure Data, 2023

- North Dakota State Penitentiary, Bismarck, houses 779 maximum to minimum custody, men.
- James River Correctional Center, Jamestown, houses 497 medium security, men.
- Missouri River Correctional Center, near Bismarck, houses 187 minimum low and community custody, men.
- Heart River Correctional Center, Mandan, was funded in 2023, to house 124 minimum-security, women upon completion.

Figure 4.14-5: Spatial Extent for Civil Disturbance

Resource	Extent
Public	Regional
First Responders	Regional
Delivery of Service and Continuity of Operations	Regional
Property, Facilities, and Infrastructure	Local
Environment	Local
State Economy	Local
Public Confidence in the State's Governance	Statewide

4.14.1.4 Probability

Civil disturbances can evolve from a variety of collective grievances and are likely to occur in North Dakota in the future. Recent years have seen an increase in civil disturbances, including opposition to the 2020 election results, reproductive rights, and human rights (foreign and domestic). House Bill 1293, passed by the North Dakota legislature, expanded the concepts of trespassing and increased penalties. These grievances and the power of social media may cause an increase in probability of civil disturbance.

4.14.1.5 Warning Time and Duration

There is no set warning time or duration for civil disturbances. While a triggering event, such as a controversial court ruling or national movement, may provide imminent warning that a civil disturbance can occur, a community event or peaceful protest may devolve into violence with little to no warning time. The duration of an event also may vary depending on the circumstances from a few hours, or in the case of DAPL, persist for months.

4.14.2 Consequence and Vulnerability Loss Analysis

This section describes the consequences and vulnerabilities of civil disturbance. Both consequences and vulnerability will be discussed in this section. A consequence is the “degree of debilitating impact that would be caused by the incapacity or destruction of critical infrastructure or a critical function” (FEMA EMI, 2023, p.1564). Consequences can be tangible impacts to buildings or systems or intangible impacts on processes, the economy, reputation, or deviance in culture. Consequences can include debilitating impacts, such as the loss of critical functions, data, or public confidence. It also includes cascading effects

that may have an effect on functionality of critical services such as the loss of service of a utility or communications.

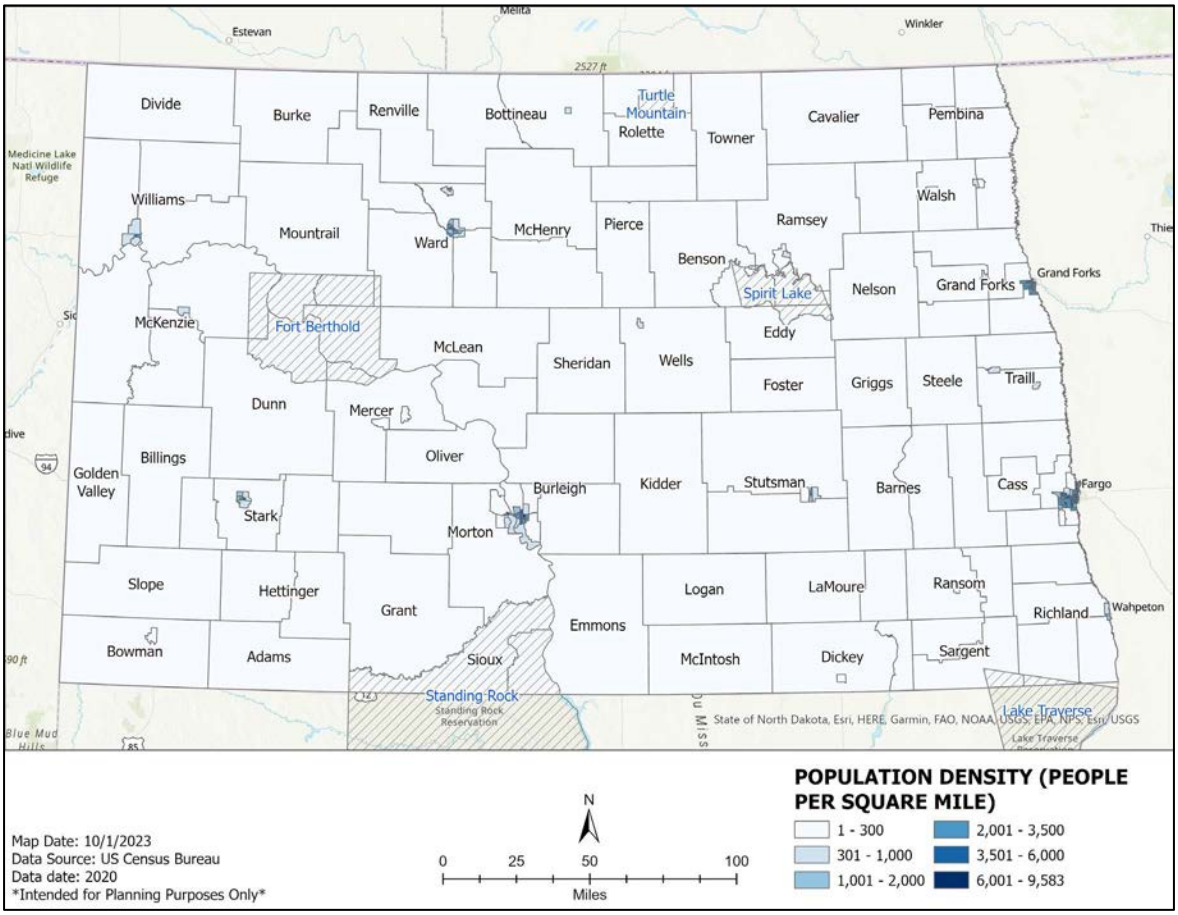
Vulnerability "is susceptibility to physical injury, harm, damage, or economic loss" (FEMA EMI, 2023, p. 104). It considers the extent of injury and damages that may result from a hazard event of a given intensity in a given area. This may be a geographic, social, or economic feature that makes harm from a hazard more likely or more intense.

4.14.2.1 Human Loss

One of the highest costs of a civil disturbance are impacted participants who can suffer injury, loss of freedom, and death. North Dakota has not recorded a fatality related to civil disturbance; however, injuries, loss of freedom, and trauma may be expected from civil disturbances for the participants.

While civil disturbance may occur anywhere in the state, areas where large numbers of people live, congregate, and host events are more likely to be sites for demonstrations that become violent and organized civil disturbance. Densely populated areas are more likely to have bystanders and property that sustain damage from these events. Population density is shown in **Figure 4.14-6**.

Figure 4.14-6: Population Density



Source: US Census Bureau, 2023

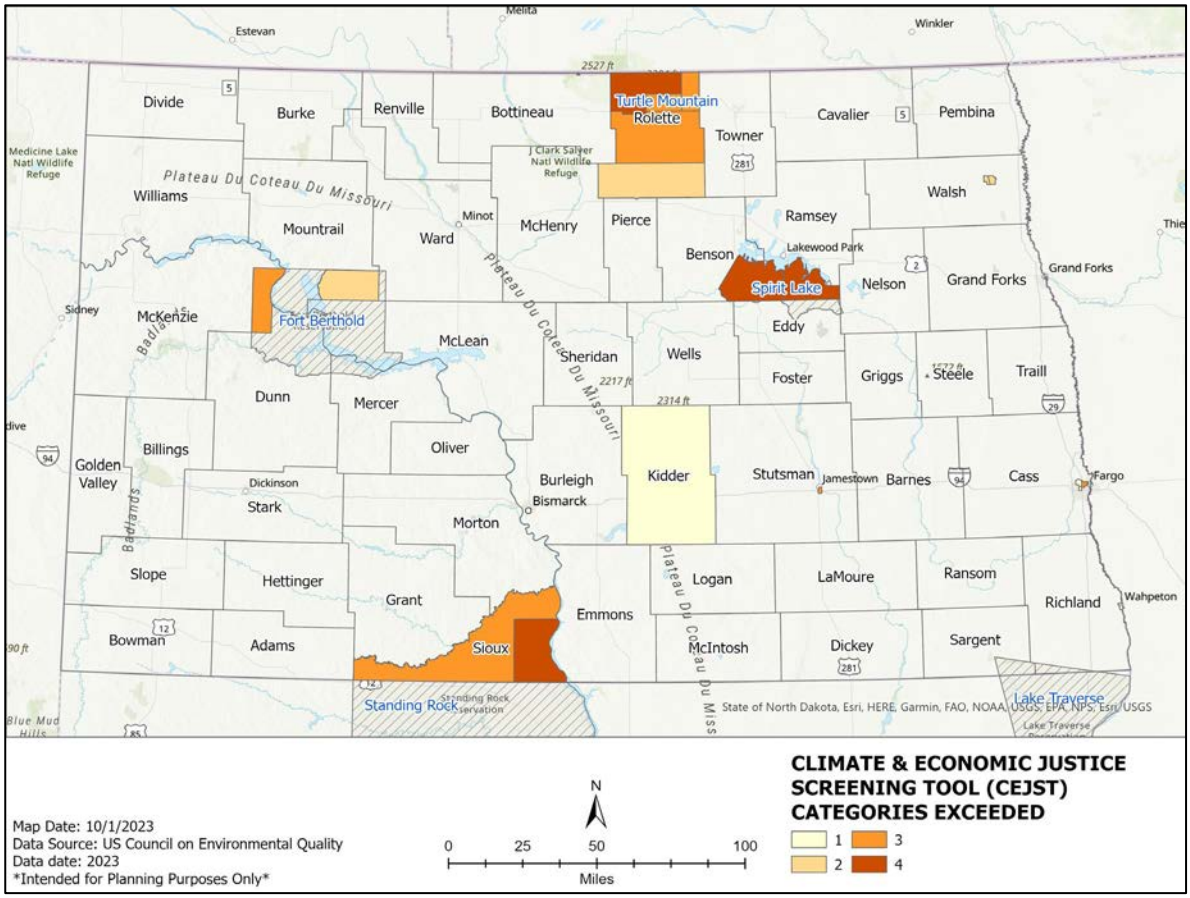
Environmental Justice, as defined by the EPA, is “the fair treatment and meaningful involvement of all people regardless of race, color, national origin, or income, with respect to the development, implementation, and enforcement of environmental laws, regulations, and policies (EPA, 2023).” This goal will be achieved when everyone enjoys:

- The same degree of protection from environmental and health hazards, and
- Equal access to the decision-making process to have a healthy environment in which to live, learn, and work.

Environmental Justice communities are more likely to be selected for locally unwanted land use. The EPA recognizes that North Dakota and its EPA region are home to Tribal and Indigenous people, migrant farm workers, minority communities, and rural low-income communities. These communities can be vulnerable to economic and governmental decisions, placing them in disproportionately vulnerable positions around controversial land use and policy practices (EPA, 2023).

The Climate and Economic Justice Screening Tool results for the state are shown in **Figure 4.14-7**, below (US Council on Environmental Quality, 2023). In these areas the burdens of climate change or hazard risk may be disproportionately high while the economic capacity to bounce back from the impacts of a civil disturbance may be low.

Figure 4.14-7: CEJST Exceedance Areas



Source: Council on Environmental Quality, 2023

4.14.2.2 First Responders

First responders form the front line during a civil disturbance event. Recent events have led to injuries to first responders, including an officer injury that occurred during the May 30, 2020, Fargo civil disturbance. While it has yet to happen in North Dakota, neighboring states have experienced civil disturbance incidents catalyzed by first responder activities. A similar occurrence in North Dakota would put first responders in a vulnerable position. Small, rural communities have fewer responders, and these responders would be at particularly high risk when faced with a civil disturbance.

Many first responder groups rely on volunteer efforts creating additional challenges. Local first responders would be more likely to request state resources due to the small number of first responders available to respond to a civil disturbance in rural areas. When large numbers of people feel aggrieved by law enforcement or criminal justice actions of perceived injustice, first responders can become vulnerable as a target for participants of a civil disturbance.

Figure 4.14-8: Civil Disturbance in Fargo, 30 May 2020

Source: Gunderson, MPR News, 2020. Reprinted with permission.

Figure 4.14-8, during Fargo's civil disturbance, protesters taunted police, threw water bottles, smashed windows of local businesses, damaged vehicles, and set a bonfire downtown (Gunderson, 2020). According to the Associated Press (2020), in response, police deployed tear gas, and the mayor and governor declared emergencies. These events may have lasting impacts on first responder groups that are responding, including those that are called in for mutual aid.

4.14.2.3 Environmental, Natural, and Cultural Resources

Trash has been a common externality of civil disturbances. At least 48 million pounds of trash were removed after the Dakota Access Pipeline civil disturbance. Waste is the primary culprit in the impact to natural resources. Clean-up after a civil disturbance is often costly, and for events occurring in natural areas, like the Dakota Access Pipeline project, there may be environmental impacts from trash, human waste, and from humans degrading the land. For environmental protests, the primary grievance may be about the importance of the natural or cultural resource at risk.

Controversial natural and sacred resources may become the site of a civil disturbance and thus be more vulnerable to the trash and human behavior that can degrade these areas temporarily in exchange for

the goal of long-term protection from the undesired use or action. Cultural institutions may also be at risk from civil disturbances in the form of vandalism and property damage. Public gathering areas near these resources are often the sites for protests that may become disturbances (McGurren, 2022). Fargo's Islamic Cemetery was subject to vandalism in 2022 when five vaults had been badly damaged or smashed open, showing that the political or social value of a cultural resource may also subject it to civil disturbance.

Figure 4.14-9: DAPL Civil Unrest Cannonball River Encampment

Source: Williston Herald, 2016. Reprinted with permission.

4.14.2.4 Property, Facilities, and Infrastructure Damage

Nearly all the past civil disturbances in North Dakota have resulted in property damage in the form of vandalism and trash. The riot in Fargo caused property damage in the form of graffiti, broken windows of businesses and vehicles, and landscape and façade damage to downtown businesses. While damage was contained to a four-block area, several businesses in the area experienced property damage, including the Gate City Bank (Associated Press, 2020). While the bank was not the target, the central location of the property made it vulnerable to the impacts of a civil disturbance. Similarly, businesses located near symbolic locations such as city halls or the state Capitol may find that their location leaves them vulnerable to rioters.

Controversial or meaningful sites or potential sites may be particularly vulnerable. The state Capitol has been the site of peaceful demonstrations in the past and may in the future be the site of a civil disturbance, due to its symbolism as a site for decision-making processes that impact the aggrieved public. Correctional facilities have been and likely will continue to be the site of civil disturbances. Riots in these locations can cause property damage and overtime costs.

4.14.2.5 Critical Facilities, Community Lifelines, and State Assets

Civil disturbances can put pressure on community lifelines. The need for law enforcement and EMS services to focus on the riot can leave limited responders available for other community needs. In rural areas, mutual aid may be enacted that draws first responders from neighboring communities to address the disturbance. This leaves not just the impacted community, but the neighboring communities facing consequences of delays of police and EMS services. Smaller rural communities may have an insufficient number of officers to address a disturbance and anything else. Injured rioters and law enforcement can put pressure on local hospitals, especially in rural areas, which may have limited resources. State assets can be symbolic but can be at risk of impacts from civil disturbance even if they are not. Demonstrations at the state Capitol are common and run the risk of becoming a riot. While symbolic sites may be more vulnerable, no state asset can fully guard itself from the consequences of angry mobs.

4.14.2.6 State Economy and Economic Disruption

During civil disturbances, businesses near the location of the disturbance usually cannot operate as they would in normal conditions, leading to loss of business locally. These businesses may face damages that require insurance claims and can alter business for short periods as they recover from the damage.

Figure 4.14-10: Vandalism to Gate City Bank in Fargo

Source: Associated Press, 2023. Reprinted with permission.

Additionally, the disruption of utilities, transportation, hospitals, and other services could result in economic disruptions. However, impacts to the state economy during most civil disturbances are minimal. Even those that target the economy typically have minimal impacts. The Freedom Convoy stopped border crossings at two sites, with little impacts to the state of North Dakota. While this caused delays and additional logistics costs for some, other crossings were unimpacted, and moving goods across the border continued with little impacts to the state of North Dakota.

4.14.2.7 Delivery of Service and Continuity of Operations

Most impacts to delivery of service and continuity of operations would be locally experienced and temporary until the riot is brought under control. Damage to critical infrastructure may cause disruptions to services until repaired. Impact on law enforcement and EMS services, previously discussed, could lead to delays in service. There can be positive consequences, as well, including increased interaction between safety professionals and the public, mutual aid, and education. The review of protocols and changes to training after a civil disturbance can help improve the process toward experiencing fewer violent incidents in the future. Fargo banned its officers from using chokeholds, with the exception of self-defense, following the 2020 civil disturbance (Baumgarten, 2020). There are no identified particular vulnerabilities for state services or operations beyond the capacity of local responders.

4.14.2.8 Public Confidence in the State's Governance

Public confidence in the state's governance is perhaps the most at risk during a civil disturbance. Most demonstrations and civil disturbances begin in response to a grievance about government action or inaction. Civil disturbance can heighten the grievance. When demonstrations turn violent, the aggrieved party can see that as the government acting in opposition to the people. Black Lives Matter organizers expressed this feeling during the month after the Fargo George Floyd protests turned into civil disturbance.

Figure 4.14-11: Black Lives Matter Protests in Fargo, June 20, 2020

While there is a risk to any action taken during a civil disturbance, choosing not to act can lead to distrust in the government to protect people and property from harm.

According to Sisk (2020), civil disturbance can also breed mistrust between levels of government. There is an active lawsuit between the state of North Dakota and the federal government related to the Dakota Access Pipeline civil disturbance for which the state is seeking compensation for the costs it spent on the civil disturbance, which occurred on private, state, and federal land and which concerned a private project approved by the federal government.

4.14.2.9 Estimation of Annual Losses

In 2016 and 2017, average losses from civil disturbances nationally were $160,399 in business loss and $1,974,010 in property loss (DeLuco, Burke and, Pillai-Essex, 2021). In between 2018 and 2020, nationally, the average amount of business loss nationally was $51,413,838 and property losses were $3,244,242 over the same period. Losses from civil disturbance reached unprecedented levels in 2020, with business owners nationally reporting a 23,151 percent increase in that year in business losses ($153,579,388) and a 21,458 percent loss in property losses ($86,849,354). These years, however, represent a period of national disturbance around issues of race and law enforcement practices.

The following impacts were realized to Stutsman County through mutual aid during the DAPL protest between September 2016 and February 2017:

- Personnel Costs: $198,188.21
- Personnel Costs (Backfill Only) $15,684.88
- Transportation Costs: $7,900.65
- Food/Lodging Costs: $28,861.80
- Materials Costs: $1,173.54

The only civil disturbance to have occurred during the plan update period in the state was the Fargo civil disturbance that occurred after a day of otherwise peaceful protests across the state. The May 30 event cost Fargo $842,000, spread across the city, county, North Dakota Highway Patrol, and National Guard expenses (Olson, 2020). If such an event occurred in a smaller, more rural location, state resources would be more heavily involved. Past trends indicate that having one or fewer incident of civil disturbance that requires state resources in a five-year period is not unusual, as the last plan update included the DAPL event alone. Using the Fargo event as the datapoint for this plan, the cost of civil disturbance over the past five years would be $168,400 annually.

4.14.2.10 Community Resilience

North Dakota adopted two laws in 2017 in response to the DAPL civil disturbance that allow for earlier interventions by law enforcement in public demonstrations for the purpose of reducing the likelihood for civil disturbance. House Bill 1293 relates to trespassing on posted property, disaster and emergency recovery costs, penalties, and emergency declarations. According to Lux (2017), House Bill 1426 increased the penalty for rioting. The intent of the law is not to disincentivize the freedom of speech, but rather encourage the protection of all citizens. This is one example of an identified gap in legislature that was addressed and now resolved.

Clifford Stott is a crowd psychologist and police advisor specializing in riot prevention. He notes that crowds become violent when they believe that an illegitimate use of police force is infringing upon their rights to demonstrate or celebrate, and individuals in the crowd see resisting police as justifiable. He recommends engaging officers in normal uniform within the crowd over riot gear at the fringes as a more meaningful engagement that demonstrates a commitment to keeping order, rather than to treat a peaceful protest as a violent act (Al-Khalil, 2020). This is facilitated by day-to-day positive engagement with law enforcement that engenders the belief that the police have a habit of taking legitimate action to maintain order.

Figure 4.14-12: Jamestown PD Shop With a Cop

Source: Jamestown PD, Facebook, 2023

Reducing grievances with the public through meaningful participation in decisions and consistent public engagement with law enforcement officers can reduce the likelihood of demonstrations and civil disturbances. Incorporating potentially aggrieved parties in the decision-making process can help to address conflicts before they become public grievances. The Jamestown Police Department, shown in **Figure 4.14-12**, sponsors a "Shop with a Cop" program to promote social justice and positive police relationships. The Bismarck Police Department invites the public to gather with officers for "Coffee with a Cop," the goal of which is to build relationships and increase trust.

4.14.2.11 Future Conditions

This section evaluates how changes in existing conditions may impact civil disturbances and the consequences that they cause.

Through the end of this century in North Dakota, future climate conditions are not expected to directly impact the occurrence of civil disturbance events, though indirectly the Extent, Intensity, and Frequency of civil disturbances could potentially be increased. The following list is based on information extracted from the NOAA National Centers for Environmental Information, Summary for North Dakota (Frankson, 2022), the Fifth National Climate Assessment (Knapp, 2023), and related resources:

- **Location.** Civil disturbance caused by climate change is not expected; however civil disturbance may be more likely at events/locations that can be tied to climate change, such as at a political rally or at the site of an oil field.

- **Extent/Intensity.** The extent and intensity of civil disturbance may increase as social anxiety regarding climate variability and change increases, though climate change itself is not expected to directly impact the extent or intensity of civil disturbance in the state.
- **Frequency.** Growing concern over climate variability or climate change may result in more frequent protests that can lead to civil disturbance.
- **Duration.** The duration of civil disturbance is not projected to change.

4.14.2.11.1 Extreme Climate Variability and Climate Change

Through the end of this century North Dakota's natural yet extreme climate variability will continue to be the primary influencer or signal within each natural hazard (Frankson, 2022). This may directly or indirectly impact areas and peoples across the state over days to decades long timescales, while the much more subtle and gradual trends of climate change over the rest of this century act to extend the range of such variability (Knapp, 2023). And such studies show, both trend and variability could extend beyond that which has previously been documented in the historical record.

Recent climate change trends have shown, and future projections suggest that the state can expect continued gradual warming in all seasons, with the greatest warming in the winter season. Overall precipitation is likely to increase, but with a high degree of inter-seasonal and interannual variability, which could lead to longer and stronger droughts interspersed with more frequent and more intense flooding (Swain, 2015). Severe summer and winter season storms will likely continue to occur in both drier, drought-prone periods, and wetter, flood-prone periods within the state's overall extreme climate variability.

Any number of things may cause a civil disturbance, whether it is a single cause or a combination of causes; however, most result from societal reasons such as economic hardship, social injustices, ethnic differences with long-standing oppression by a group of people towards another, objections to world organizations or certain governments, political grievances, and terrorist acts (USAR, 2005). Future climate projections through the end of the century do indicate the potential for increased societal insecurities and instabilities (Hoegh-Guldberg, 2018), including places like the Northern Great Plains region as exemplified by recent Dakota Access Pipeline (DAPL) civil disturbance (Powys-Whyte, 2016;

Levin, 2016; EELP, 2023). In most such cases, climate conditions are not the direct cause of disturbance but may exacerbate underlying instabilities.

As discussed in Section 3, the cascading ecological effects of climate change could result in less ability for families to provide for themselves, increasing refugee and migration flows, and acting as catalyst for the increased spread of diseases (Causevic, 2017). Researchers have also found that increased geopolitical risk and corruption, whether enhanced by climate change or not, can in turn lead to increased greenhouse gas emissions in those affected regions (Anser, 2021), that may lead to a feedback loop for further global instability unless policies are enacted to reduce the growth of shadow economies and their effects on geopolitical uncertainty (Chu, 2023). From a security standpoint, climate change may be a threat capable of multiplying and aggravating already existing problems (water shortages, droughts, etc.) as well as generating fertile ground for future personal, civil, and nation-state security threats.

4.14.2.11.1.1 Impact

Within the state, and across the Northern Great Plains (NGP) in general, the direct physical or ecological impacts from our extreme climate variability, current climate trend, or climate change projections are not expected to have a corresponding primary or direct cause/effect relationship to Criminal Attack, much like Civil Disturbance, based on global analyses (Benjaminsen, 2016). There may be secondary or indirect effects apparent in certain regions like the Middle East and North Africa, where climate change may trigger, accelerate, or deepen existing civil or personal instabilities (Sofuoğlu, 2020). And it's speculated that such an effect could eventually be felt in North Dakota as well.

Climate change in the post-industrial era, to-date, is suspected of having affected food production and exacerbated food insecurity in certain developing countries of Sub-Saharan Africa (Aribigbola, 2013; Evans, 2021). However, physical science studies of these same areas have found that interannual or multi-decadal climate variability, as opposed to long-term climate change, is more likely the underlying cause of recent drought and flood episodes (Paeth, 2011; Taylor, 2017), like what has been found for the NGP region (Hoell, 2019; Hoell, 2023). As discussed in Chapter 3, such short-term climate variability quite often leads to substantial impacts while background climate trends can seem harmless.

4.14.2.11.1.2 Adaptation

There are no expected direct impacts expected by climate change on civil disturbance in the NGP, so there are no specific adaptation actions at this time other than those already suggested as part of other hazards.

4.14.2.11.1.3 Mitigation

There are no expected direct impacts expected by climate change on civil disturbance in the NGP region, so there are no specific mitigation actions at this time other than those already suggested as part of other hazards.

4.14.2.11.2 Other Changes

A Pew Research Center study in 2021 found that Americans were more likely to identify their country as politically divisive than citizens from 16 other developed nations across the globe (Connaughton, 2021). A similar survey was conducted in 2012. Comparison of the two studies shows at least a 20-point

increase in divisiveness. The Covid-19 pandemic response, close elections and ethnic, racial, and religious diversity and conflict are seen as the primary drivers of this increase in divisiveness (Lauter, 2021). Urban areas within the state are anticipated to have a 24.6 percent growth rate between 2020 and 2040 (U.S. Census Bureau, 2020). Areas in or near Fargo, Grand Forks, Bismarck, and Williston will see more infill or fringe development and development of nearby smaller communities, increasing the size of public events, and thus quite possibly limiting the ability of responders to keep deteriorating skirmishes from becoming riots.

4.14.3 Risk Analysis

Risk can be defined as the potential for loss of or damage to an asset (FEMA EMI, 2023). This section analyzes the potential for loss or damage in the state of North Dakota.

4.14.3.1.1 National Risk Index

The National Risk Index does not evaluate this hazard.

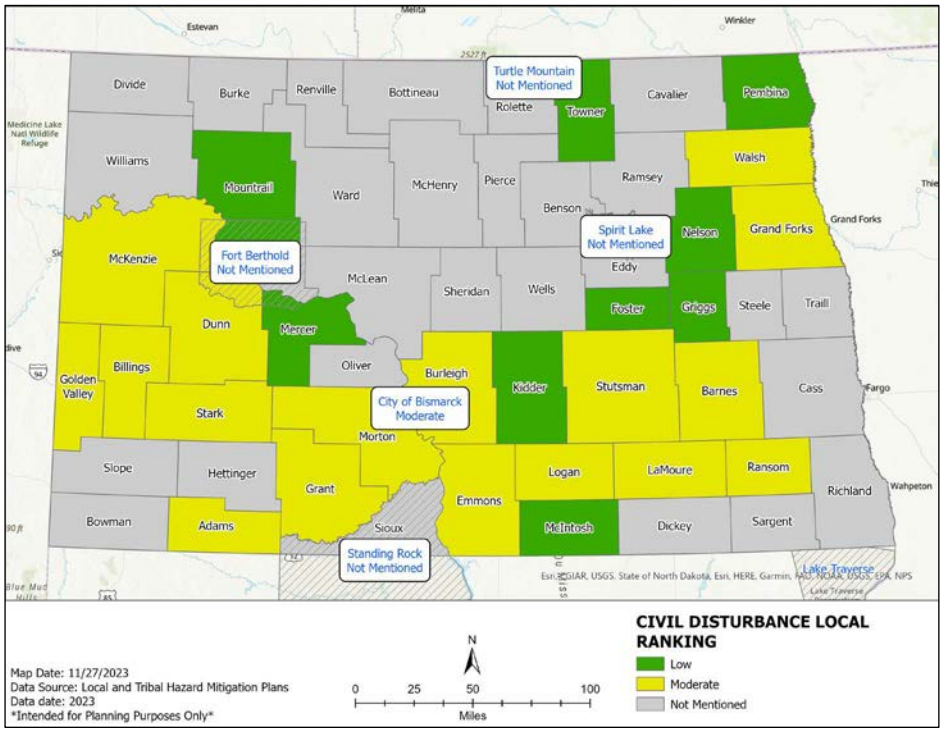
4.14.3.1.2 Risk Index Score

The Priority Risk Index for this plan update ranks civil disturbance as a low risk with a score of 1.4. Civil disturbance is ranked 14th out of 15 hazards.

4.14.3.1.3 Jurisdictions at Risk

When evaluating local and tribal mitigation plans, 27 of 58 of the adopted plans identify civil disturbance as a hazard impacting their jurisdiction, as shown in **Figure 4.14-13**. Of all plans that ranked hazards, nine considered it a low risk and the rest identified it as a moderate risk.

Figure 4.14-13: Civil Disturbance in North Dakota Local Hazard Mitigation Plans



Source: Local and Tribal HMPs, 2023

4.14.4 Summary/Conclusion

The following bullets summarize highlights and conclusions related to civil disturbance.

- North Dakota's history of civil disturbances, while not including a large number of events, does have a wide variety of initial motivations.
- The rural nature of North Dakota means that there is often limited local law enforcement capacity, necessitating the use of state assets.
- Reviewing procedures and training can help ensure proper actions are taken when necessary.
- Trash and vandalism are negative externalities related to civil disturbances.
- Civil disturbances can enhance political grievances and foster a lack of public confidence in state and local governance. An increase in divisiveness nationally could lead to more civil disturbances in North Dakota.
- More interaction between law enforcement and the public increases public trust and reduces the risk of civil disturbance.

4.14.5 Data Limitations

North Dakota has a history with a wide variety of civil disturbances, including disturbances related to entertainment, the environment, and politics. Any of these or something new could turn into a civil disturbance. There is no dataset that would allow for forecasting which events might turn violent.

4.15 Transportation Incident

4.15.1 Overview

4.15.1.1 Description

For the purpose of this plan, a transportation incident is any occurrence associated with the operation of a vehicle (motor vehicle, train, aircraft, or vessel) that results in a fatality, injury, or property damage that exceeds the local and tribal response capacity.

There is substantial overlap between this hazard and most other hazards addressed in this plan.

A transportation incident that results in the release of hazardous material would be discussed in Section 4.4.11. An example of this would be the 2002 Minot train derailment that released anhydrous ammonia. If transportation vehicles are used for the purpose of enacting political or social change or protesting political actions, it would be discussed in section 4.4.13. Terrorism attacks that use vehicles as a weapon would be discussed in section 4.4.13. An example of a civil disturbance using vehicles would be the Freedom Convoy of truckers that shut down border crossings in protest of COVID-19 restrictions, discussed in section 4.4.14. Material from these sections should be considered for a complete description of transportation incidents and how they may impact the state.

Vision Zero

Vision Zero is the state's strategy to move to zero traffic fatalities. In 2022, there were 101 traffic fatalities. Actions toward reducing this number include changes in laws, new services, and personal responsibility. The Five Es of Education, Environment, Enforcement, Engineering, and Emergency Medical Services embody changes in strategy to reduce traffic fatalities.

Changes include:

- Since August 2023, seatbelt laws became a primary offense, allowing law enforcement officers to cite drivers they witness not wearing seatbelts. In 2022, 69 percent of traffic fatality victims were unbelted. North Dakota trails the nation in seatbelt usage.
- Working with ride-hailing and insurance services, the state has created a sober ride program that provides discounted rides during holidays and events with high alcohol consumption to reduce the 4,080 DUI arrests in 2022.
- Four Safety Corridors were adopted across the state where increased signage and enforcement work together to reduce traffic accidents in traditionally less safe areas.
- Increased traffic incident management training for fire, public works, and law enforcement
- An enhanced Move Over Law to provide first responders more space on the side of the road.
- Updated road closure law so law enforcement can ticket for not adhering to road closures with the intent to keep people off the roadways when it is not safe (NDDOT Vision Zero, 2023)

A motor vehicle is defined by federal law as "every description of carriage or other contrivance propelled or drawn by mechanical power and used for commercial purposes on the highways in the transportation of passengers, passengers and property, or property or cargo" (18 U.S.C. Ch. 2, 2018). This would include tractor-trailers, tanker trucks, buses, automobiles and/or motorized farm machinery, such as combines or tractors.

Federal law defines a train as “one or more locomotives coupled with or without cars” (49 C.F.R. §220.5, 2015).

Federal law defines aircraft as “a civil, military, or public contrivance invented, used, or designed to navigate, fly, or travel in the air” (18 U.S.C. Ch. 2, 2018). All aircraft based in the state for 30 days during a calendar year must be registered with the state’s Aeronautics Commission and pay a registration fee (North Dakota Aeronautics Commission, 2023). Federal law (C.F.R. § 830.5, 2015) also provides the conditions under which an aircraft incident must be reported to the National Transportation Safety Board (NTSB) as incidents in which there is a flight control system malfunction, injury or illness of a flight crewmember, engine issue, fire, collision, damage exceeding $25,000, release of propeller blade, loss of at least 50 percent of cockpit display, collision system advisory or runway incident, with additional criteria for multi-engine or missing aircraft.

The North Dakota Game and Fish Department defines a vessel as “any watercraft, other than a seaplane on the water, used or capable of being used as a means of transportation on water.” Any vessel propelled by motor must be registered in North Dakota as a watercraft and pay annual registration fees (NDGF, 2023). Any accident on North Dakota waters that results in injury, death or disappearance of a person or causes damages exceeding $2,000 must be reported to North Dakota Game and Fish Department.

Figure 4.15-1: Bison in the Road, Theodore Roosevelt National Park

Source: Jessica Bundage, NPS, (n.d.)

While small accidents can be handled without law enforcement, large incidents, especially in rural areas, can exceed the capabilities of local law enforcement, where there are limited resources. With larger transportation vehicles that carry cargo, an accident can become a mass casualty event, and lead to road or track closures that impact the state economy. The presence of agriculture and wildlands introduces the risk of large-animal collisions. Livestock and the need to transport them can create a potential hazard. Livestock or free-ranging wildlife may stray onto railroad tracks, highways, or airfields and present a collision risk or divert a vehicle into oncoming traffic. Impatience with slow-moving farm machinery can similarly cause ill-timed diversions into danger. A commercial aircraft incident could overwhelm local and state response resources.

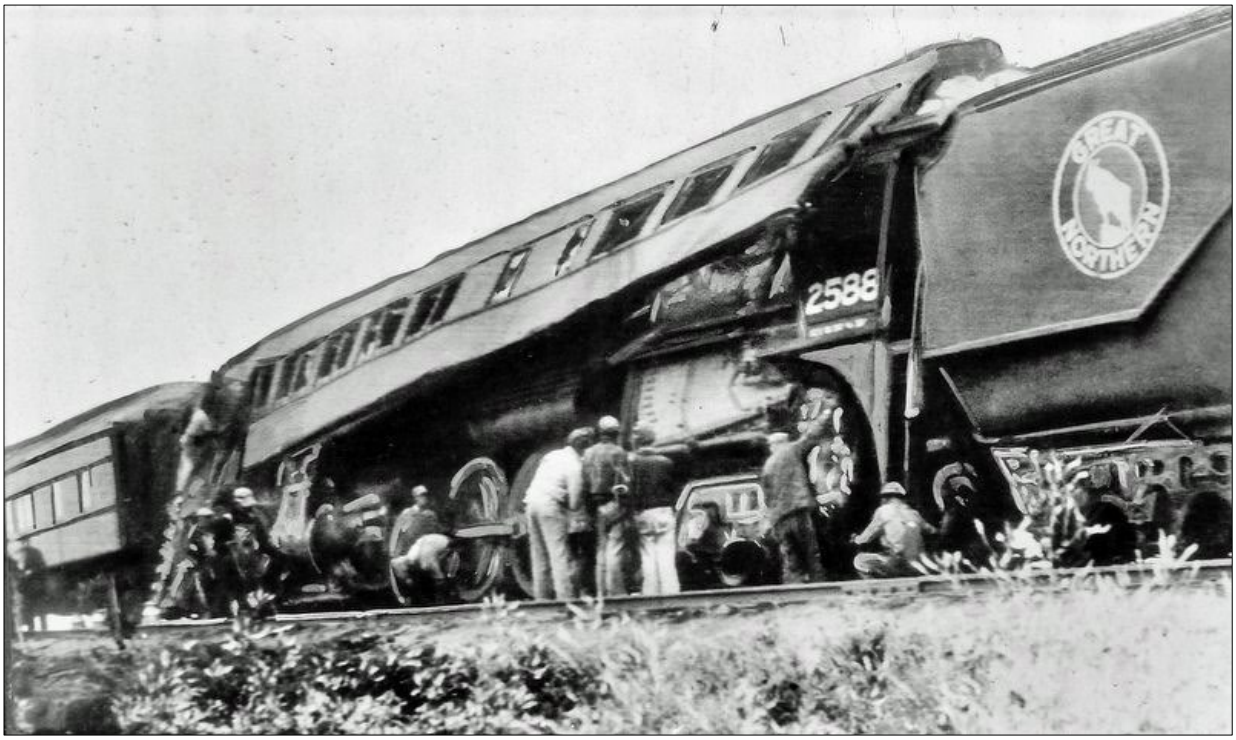
Transportation concerns include pedestrian and bicycle traffic as well. North Dakota Moves includes these forms of transport in their ND Moves Active Public Transportation and Transit Plan (NDDOT,

2019). Pedestrian and bicycle accidents have increased by 19 percent since 2013. It is unclear whether this rise is due to increased pedestrian and bicycle traffic or due to increased traffic in general. The North Dakota Department of Transportation has a bicycle and a pedestrian safety page on its website providing safety tips and rules for cyclists and pedestrians as well as rules for motor vehicle operators when sharing the road. NDDOT Rules of the Road has an entire chapter dedicated to bicycle operation on public roads and addresses rules to be followed by pedestrians and motor vehicle operators in regard to pedestrians.

4.15.1.2 Previous Occurrences

The following section describes recent notable events of traffic incidents in the state of North Dakota.

Figure 4.15-2: 1945 Michigan ND, Passenger train accident.



Source: North Dakota State Historical Society, 1945

On August 9, 1945, two 11-car passenger trains left Brocket, westbound. The first train suffered a mechanical problem, and the second train could not stop in time, ramming into the back of the first train (Bonham, 2012). The catastrophic accident in Michigan, ND, caused 312 injuries, and 34 deaths, among the dead were 19 veterans returning from World War II.

The closest North Dakota has come to a commercial aviation crisis was in October 2007, when Northwest Airlines flight 1432 from Minneapolis landed in Fargo with 134 passengers, a malfunctioning braking system, and flames in the nose guard (Baker, 2020). No one was injured, and the flames were put out upon landing.

Figure 4.15-3: Fireball following train derailment near Casselton ND, 30 December 2013.

Source: NOAA Office of Response and Restoration, 2013

On December 30, 2013, a broken axle caused a Burlington Northern Santa Fe (BNSF) train carrying 112 cars of grain to derail 13 cars just a mile west of Casselton in rural Cass County. The first of those cars spilled and leaned over onto adjacent tracks. Less than a minute later, a 104-car BNSF train carrying crude oil failed to hear the emergency alert and struck the derailed grain car, causing 476,000 gallons of crude oil to combust. Explosions could be heard and felt in Casselton as tanker cars exploded. The train carrying Bakken crude oil derailed a total of 21 cars, 20 of them tanker cars. Response exceeded the Casselton Fire Department's (CFD's) capabilities (NTSB, 2017; Springer, 2018). The Cass County Sheriff's Department was called in to assist in setting up a safety perimeter to protect the public during the firefight. With the derailment occurring outside of a heavily populated area, there were no injuries or fatalities, and crew members were able to escape without consequence. Nearby Casselton evacuated 1,400 residents as a precaution. Damages were estimated at $6.1 million.

In reaction to the event industry safety standards, the requirements for tanker cars were raised, requiring stronger double-sided tanks and improved braking and venting systems. Since the 2013 event, pipeline capacity has increased which has reduced the amount of Bakken crude travelling by rail through communities like Casselton, which at the time of the incident had more than 10 oil trains pass through each day, became a case study that helped develop better training for train-derailment response. CFD's response capacity was found to have benefited significantly from its planning for an explosive incident at the nearby Tharaldson Ethanol Plant, using many of the developed protocols and practices in the oil-train derailment (NTSB, 2017; Springer, 2018). Yet they were one of many local agencies that responded.

In July 2013, a Bakken bulldozer operator hauling gravel was killed when it was struck on the train tracks crossing a private road (Wahpeton Daily News, 2013). There were no crossing gates, and the Amtrak driver did not see the dozer until it was too late to avoid the collision. The train was delayed 11 hours while awaiting a new locomotive.

Additional hazardous train derailments occurred near Heimdal (Wells County), which was evacuated in 2015 (Seville et al., 2015), and near Wyndmere (Richland County) in 2023 (Schroeer & Hjelmstad, 2023).

Bridge or culvert failures have caused accidents and lengthy road closures in the state. A 42-ton truck attempted unsuccessfully to pass over the 56-foot-long Goose River Bridge in July 2019 (Helsel, 2019). The 14-ton-limited historic structure buckled under the weight. The bridge was the oldest in Grand Forks County. The driver was cited with a $11,400 citation, but repairs to the 1906 structure were estimated to be about $1 million. The low traffic and prohibitive cost to repair the bridge led to its abandonment and removal, losing the rare 20th Century structure forever..

Figure 4.15-4: Northwood historic bridge fails under heavy weight.

Source: Grand Forks County Sheriff's Office, 2019

A vehicle rollover resulted in the death of the pregnant driver and her unborn child in April 2018 on I-29 in Fargo after the unbelted driver was ejected (Fargo Forum, 2018).

Two notable and fatal aviation accidents have occurred in 2018. In July 2018, a plane was found submerged in the Missouri River near the Fort Rice boat ramp with the pilot dead on board (NTSB, 2020). The pilot had been hired for a commercial aerial photography assignment and likely failed to notice the ice warning display on his plane and failed to take preventative action prior to engine failure. In November 2018, an air ambulance left Bismarck with plans to arrive in Williston to pick up a patient bound for Bismarck (Griffith, 2020). The plane crashed near Harmon, killing the pilot, nurse, and paramedic on board, after a pilot error led to a breakup of the plane before impact.

In November 2019, 383,000 gallons of crude oil leaked from the Keystone Pipeline, near Edinburg, leading to a shutdown of the pipeline (Gajanan, 2019; MacPherson, 2019). The leak impacted wetlands among the 209,100 square feet of land harmed by the leak, which was discovered when a pressure drop was observed by remote monitors. Service on the line was shut down for nine days.

A swerving semi-trailer truck towing a loaded asphalt truck that had prompted 911 calls on Highway 2 slammed into seven vehicles that had stopped for construction near Airport Road in Grand Forks in July 2021, killing an Iowa doctor (Monk, 2021; Hjelmstad, 2021).

Human error has also caused accidents in the state. A September 2021 incident seven miles south of Fargo occurred when a vehicle crossed the middle line in an I-29 construction zone, hitting another vehicle head on. Both drivers were killed, and three passengers were injured in the incident (Associated Press, 2021; Von Pinnon, 2021). A December 2022 accident on Highway 52 in Anamoose resulted in a fatality with a similar head-on accident caused by an inpatient driver seeking to go around slower moving traffic. The driver of a pickup struck a car going westbound in the eastbound lane, then struck the semi he was seeking to pass on his way to a funeral. The driver of the car died of her injuries, and the pickup driver had to be extracted from his vehicle and had to be flown to Minot for care (Huebner, 2022). The family had tried to talk the pickup driver out of driving believing that his age had created poor decision-making and put others at risk.

Figure 4.15-5: Part of a multi-vehicle accident on I-94 near Casselton.

Source: North Dakota State Highway Patrol, 2022

Winter conditions are not the only cause of dangerous vehicle crashes in the state. Summer fog caused a 12-car pileup on Highway 52 near Sawyer, causing just minor injuries, but closing the Ward County Highway for hours in August 2022 (Skurzewski, 2022). Wind was a factor in a fatal car accident near Edgeley, when a gust flipped and detached an empty tanker, blowing it into a pickup that flipped on Highway 281 in November 2022 (Nelson, 2022). The passenger of the pickup was killed, and the driver had serious injuries.

A rush-hour multi-vehicle pileup on I-29 just south of Grand Forks in January 2022 caused just minor injuries but shutdown the Interstate for hours when whiteout conditions and blowing snow caused 20 cars into chain reaction accidents and to be run off the road. A Grand Forks County Sheriff's Office squad car was among those involved (Larsen, 2022; Walling, 2022). A month later, blizzard conditions struck again on I-94 near Valley City, then three days later near Casselton. In the Valley City Incident, 14 vehicles piled up with one person suffering serious injuries and three others experiencing minor injuries (Hjelmstad, 2022).

Three days later, near Casselton, six people were sent to the hospital. The Interstates were closed south and west of Fargo for much of the day due to conditions and clean-up from the accident that involved six semi-trucks and eight passenger vehicles (Olson, 2022). In November 2022, about two dozen vehicles were involved in an I-94 pileup near Jamestown that was caused by an icy mist. After a State Highway Patrolman stopped for the original incident, he had to jump into a median to avoid being hit by other vehicles joining the pileup (KVRR, 2022). Several of those involved were treated for minor injuries.

A tractor driver and a GMC Yukon minor passenger were each treated for serious injuries when the Yukon rear-ended the tractor that was towing a grass cutter on Highway 13 near Dwight in Richland County (Stanko, 2022). Two fire departments, a sheriff's office, the Highway Patrol, NDDOT, and ambulance and a towing company responded to the July 2022 accident which closed the highway for two hours.

Figure 4.15-6. In May 2022, 11 cars of a BNSF freight train derailed near Burlington, catching fire. One of the derailed cars carried hazardous materials but did not catch fire. Response proved challenging given the location between wet fields and an embankment. Rescue vehicles became mired in the mud while attempting to suppress the fire (Skurzewski, 2022). The North Dakota National Guard had to respond, dumping water from Blackhawk helicopters to extinguish the fire. Tracks were closed for 18 hours to contain the incident and two houses were evacuated.

Figure 4.15-6: Blackhawk helicopter Suppresses Burlington Train Derailment Fire

Source: Staff Sgt. Sam Kroll/North Dakota National Guard, 2022

An accident in which a school bus and a pick-up truck collided, killed the pick-truck driver, and sent 27 bus passengers to the hospital after the bus rolled several times and landed on its side in a ditch in September 2023 in Petersburg. Among the bus passengers were 25 members of the Hatton-Northwood High School volleyball team (Henson, 2019). The Nelson County setting meant that there were few nearby first responders. Dispatchers at the Lake Region 911 Center reached out for 15 ambulances from as far as 50 miles away to bring victims to Altru Health in Grand Forks, where the emergency room was quickly preparing to receive a surge by converting the ambulance garage into an expanded triage center (Henson, 2023). While the rural setting of the mass-casualty event posed a challenge, the hospital and regional first responders were prepared, and all students were out of the hospital within five days.

Fearing that seeking help would end a potential career in aviation, 19-year-old UND sophomore John Hauser committed suicide by flying a plane into a Buxton field in October 2021 (Henson, 2021). The presence of an aviation program and agriculture places several small aircrafts into North Dakota skies, including those out for agricultural purposes, and pest control (Kraft, 2023). A USDA-contracted pilot crashed during a low-altitude turn near St. Anthony, destroying the plane; the pilot and co-pilot suffered minor injuries in May 2023.

Two fatal crop spraying accidents occurred in September 2023. The first occurred on September 12, 2023, when the left wing of airplane contacted a guy wire attached to a power line structure near

Ardoch (Henson, 2021). The second fatality occurred one week later on September 19, 2023, when the pilot flew underneath powerlines while spraying a field near New Rockford, near State Highway 281.

The drivers of two vehicles were killed in Wahpeton along Highway 13 in March 2023 when a passing vehicle struck them as they attempted to pull one of the vehicles from a snowdrift (Urness, 2023). In March 2023, a tractor-trailer hauling airplane stopped in a travel lane for more than two minutes on Interstate 94 near Mapleton (Baumgarten, 2023). This caused the trailing car to collide and catch fire, killing the car driver, closing westbound I-94 for eight hours, and both lanes for an hour. The truck driver was accused of reckless endangerment and negligent homicide charges for failing to pull over onto the shoulder (Baumgarten, 2023). Similarly, it was an abandoned tow truck in the driving lane on I-94 near Tower City in January 2022. A family in the trailing car struck the stopped vehicle, killing a 43-year-old mother and seriously injuring two of her daughters (Fargo News, 2022; Taylor and Hurley, 2022; Hurley, 2022). The tow-truck driver was operating the vehicle under a suspended license, was uninsured and faced reckless endangerment and negligent homicide charges.

In March 2023, a 14-year-old male from White Earth was killed when the vehicle he was driving was struck by a freight train, after he failed to yield at the intersection in Mountrail County (Nelson, 2023). About a month later, two Williston teens were killed as passengers in a pickup truck struck by a passenger train near Williston when the 17-year-old driver of a pickup truck failed to yield (Jachim, 2023). The driver was injured. On March 27, 2023, a Canadian Pacific train derailed in rural North Dakota near Wyndmere, Richland County, in which 31 of the 70 cars left the tracks (Schroeer, 20203). The Canadian Pacific spokesman noted that four cars were filled with liquid oil used for asphalt, two railcars were filled with ethylene glycol, also known as airplane deicer, and one rail car filled with propylene which were spilled into a nearby ditch (Lambrecht, 2023). Richland County emergency management coordinated with local, state, federal, and private stakeholders to ensure the spill was remediated and nearby residents were informed.

Figure 4.15-7: Bakken Semi-Truck Rollover

Source: Bakken Oilfield Fail of the Day, Facebook, 2023

Figure 4.15-7. Despite improvements in roads and increasing reliance on pipelines, trucks hauling Bakken oil, sand, salt water, pipe, chemicals, and other cargo have been involved in an ever-increasing number of semi-truck accidents in western North Dakota (Emerson, 2019). From 2007 to 2017, 42 percent of semi-truck accidents in the state were in McKenzie, Williams, and Mountrail counties despite a $2 billion investment from the state in creating truck bypasses and expanding lanes.

A September 2023 law enforcement action prompted a three-car accident in Minot. While assisting the Ward County Drug Task Force, in an investigation into drug activity, the Minot Police Department stopped one of the suspects in southwest Minot. When

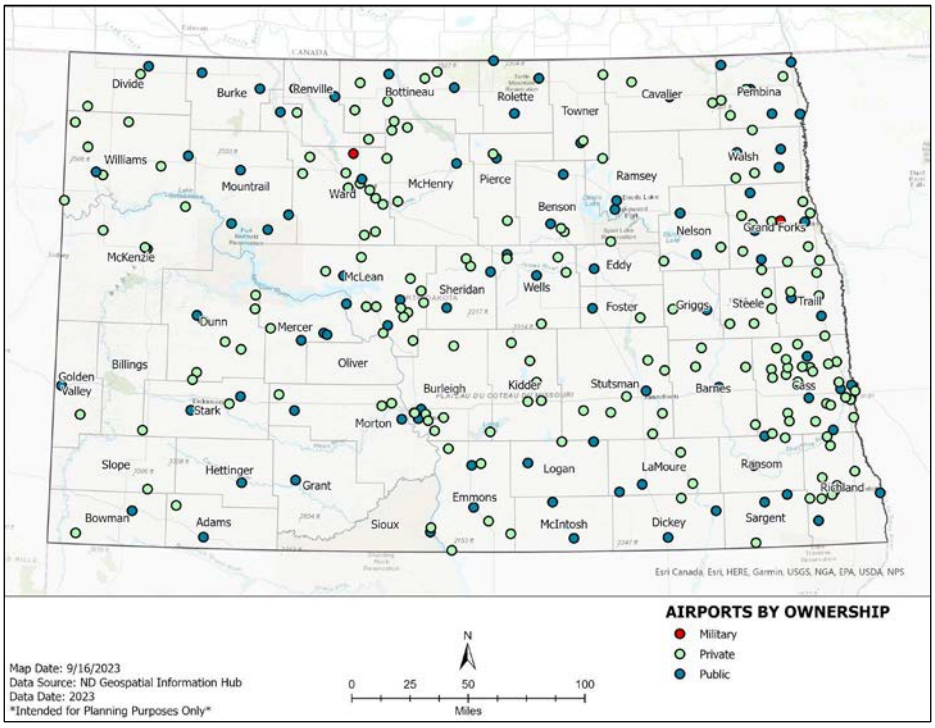
Police identified themselves to the driver, he fled arrest, causing a three-car accident that caused serious injuries to a Bismarck woman (DeVries and Rodenberg, 2023). Police did not pursue but arrived at the accident scene to arrest a 37-year-old New Town resident for possession of fentanyl, possession of drug paraphernalia, fleeing an officer and reckless driving with other charges pending investigation.

4.15.1.3 Location and Extent

Transportation networks are the sites of most traffic incidents. Railroads are limited to rail tracks, and while vehicles and aircraft can have accidents away from airports and highways, the overwhelming majority of accidents occur in airfields or on roadways.

Figure 4.15-8 shows military, public, and private airfields in the state. There are eight commercial airports, and an additional 81 public-use airports in the state. There are a total of 177 private airfields in the state.

Figure 4.15-8: Airfields in North Dakota



Source: North Dakota Geospatial Information Systems Hub, 2023

On June 13, 2020, a fatal plane crash occurred at the Mandan Airport. A 57-year-old farmer from the Stanton area of North Dakota died when his homebuilt place crashed after takeoff. Conditions were clear at the time. The plane was a two-seat, single-engine aircraft built from a kit. The preliminary report from the National Transportation Safety Board (NTSB) says that "a witness observed the airplane on the ramp prior to the flight and advised the pilot that the rear seat belt was securing the rear control stick. The pilot subsequently departed in the airplane … and the airplane subsequently had a steep climb. The airplane descended, impacted terrain, and a ground fire occurred." *(Morton County Multi-Jurisdictional Hazard Mitigation Plan, 2020)*

Figure 4.15-9 identifies the locations in the state with more than two train related incidents between 2018 and 2022. Bakken-area counties of Ward (11) and Mountrail (6) have the most train related incidents during that time.

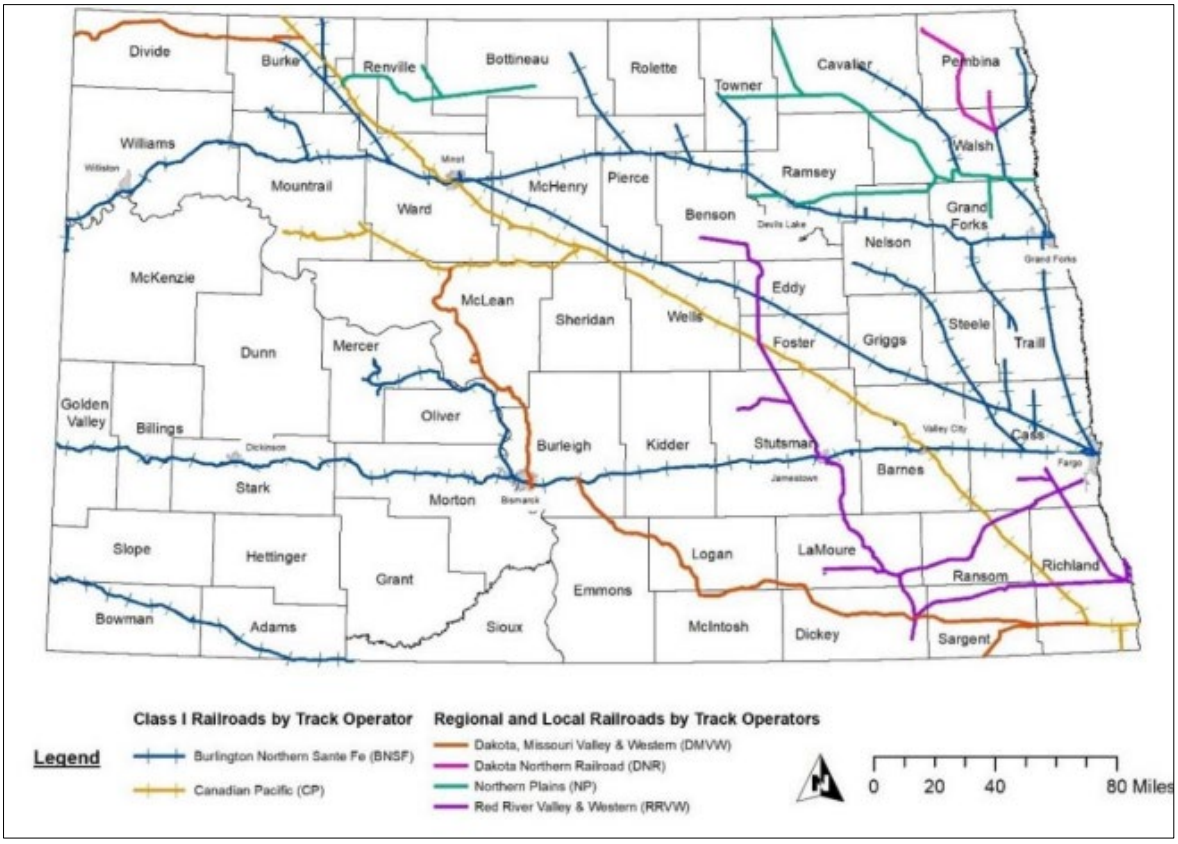
Figure 4.15-10 shows the compiled rail systems of the Class I and regional tracks in the state, and the denser track network in eastern counties. Amtrak passenger service runs along the BNSF network in the state. There are seven passenger stations in the state that run once a day in each direction on the Empire Builder route. The seven passenger stops are in Fargo, Grand Forks, Devils Lake, Rugby, Minot, Stanley, and Williston. There are two Class I freight carriers – BNSF and Canadian Pacific Kansas City Southern (CPKC) – and four additional regional carriers that primarily bring agricultural goods to the Class I carriers.

Figure 4.15-9: Counties with more than two train-related incidents, 2018-2022.

County	Incidents
Ward	11
Mountrail	6
Foster	5
Morton	5
Cass	4
Dickey	4
Grand Forks	4
Logan	4
Williams	4
Mclean	3
Walsh	3

Source: Federal Railroad Administration, 2023

Figure 4.15-10: Railroad Network in North Dakota



Source: NDDOT, North Dakota Freight and Rail Plan, 2023

Figure 4.15-11 identifies fatal crashes by weather condition. Cloudy conditions contributed to the most accidents in Grand Forks County, but McKenzie County recorded a large number of fatal accidents caused by precipitation, blowing snow, and smoke or fog (Fatality Analysis Reporting System, 2023).

Figure 4.15-11: Top Counties for Fatal Vehicle Crashes by Weather Condition, 2017-2021

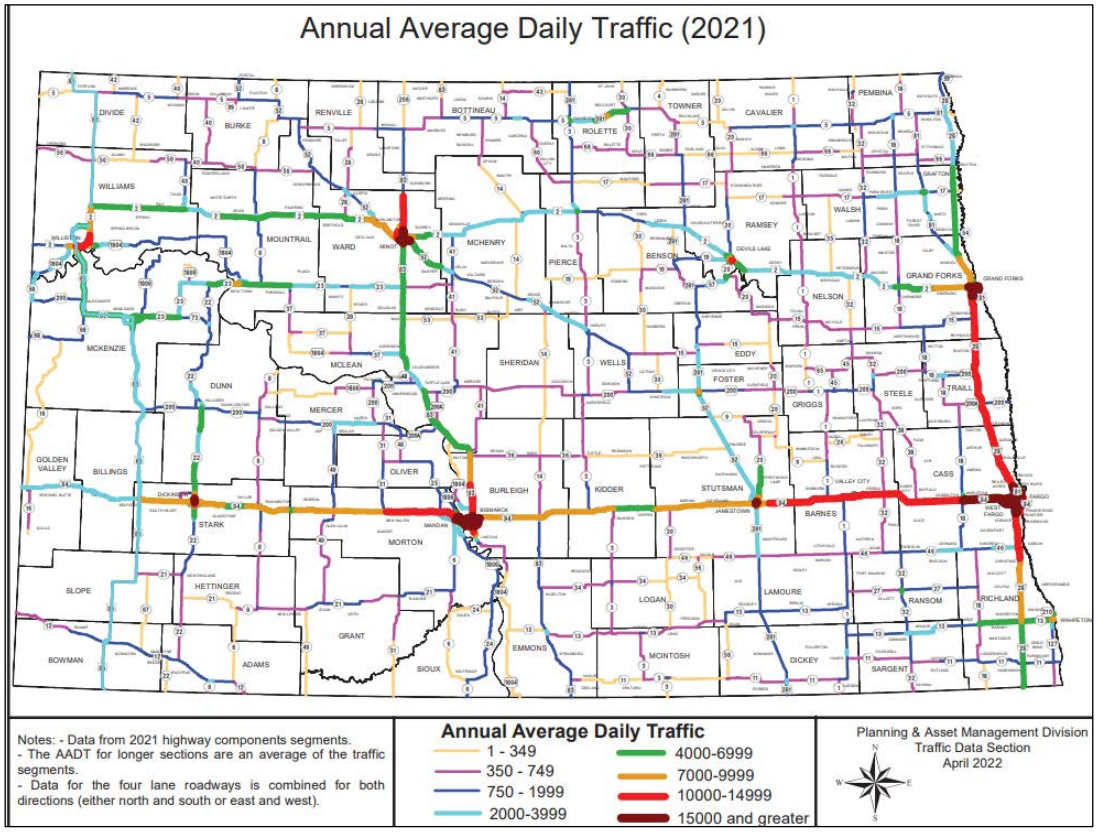
Condition	County	Crashes
Blowing Snow	McKenzie	2
Cloudy	Grand Forks	10
Fog, Smog, Smoke	McKenzie	3
Rain (Mist)	Cass, McKenzie	2
Snow	McKenzie, Williams	2

Source: Fatality Analysis Reporting System, 2023

The locations in the network at greatest risk for accidents are at intersections with roadways and near railyards, where trains may be switching tracks or loads, changing speeds, and reversing direction. BNSF runs 90 trains a day over 1,632 miles of track. BNSF has five rail yards in the state located in Dickinson, Minot (Gavin Yard), Grand Forks, Mandan, and Williston (North Dakota Freight and Rail Plan, 2023). CPKCS runs 34 trains along 530 miles on a single main line in the state that runs diagonally through the state from the northwest to southeast. It operates three yards in Enderlin, Minot, and Portal

Figure 4.15-12 shows the major highways in the state along with the average annual daily traffic volume. Highways with the most traffic are the most at risk of creating a mass-casualty traffic incident. Interstates and highways near major urbanized areas are the areas with the highest traffic.

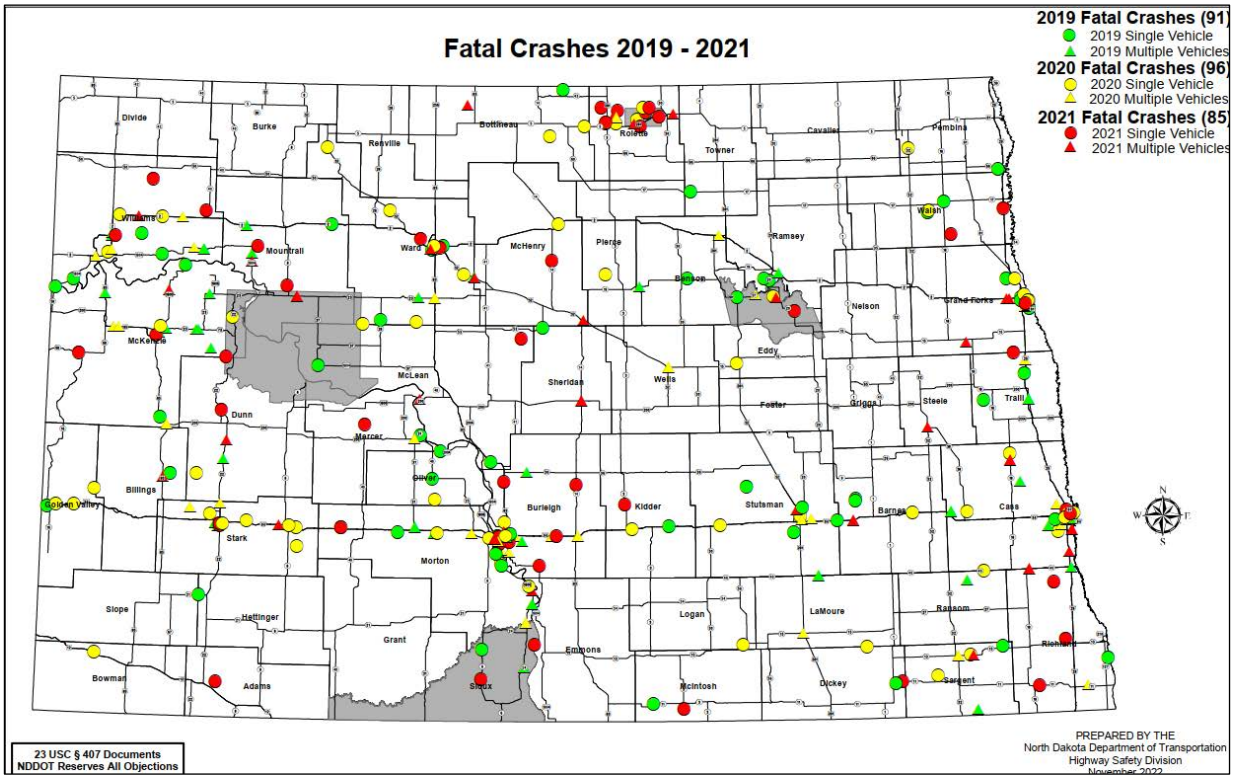
Figure 4.15-12: Highway Network in North Dakota



Source: North Dakota Department of Transportation, 2022

Figure 4.15-13, taken from the State Freight and Rail Plan, currently shows truck crashes are highest in Grand Forks, Fargo, Minot, Bismarck-Mandan, and the Bakken. Most fatal crashes still occur in rural areas where there are usually more unbelted drivers, which counts heavily in the overall traffic fatalities during the 2018-2023 plan period.

Figure 4.15-13: Locations of Fatal Traffic Accidents in North Dakota, 2019-2021



Source: North Dakota Department of Transportation, 2022

Figure 4.15-14 shows a summary of the spatial extent for Transportation Incidents. Since 2013, crashes involving people walking and bicycling have increased by 19 percent in North Dakota. It is unclear if this is due to an increase in pedestrian and bicycle traffic or an increase in traffic in general. The analysis of high-risk roadways suggests that crashes are much more likely to occur in urban areas (NDDOT, 2023). Within urban areas, crashes are most likely to occur at intersections and on arterial roadways. While there are fewer crashes in rural areas, they tend to result in greater injury and are most likely to occur at non-intersection locations across the network.

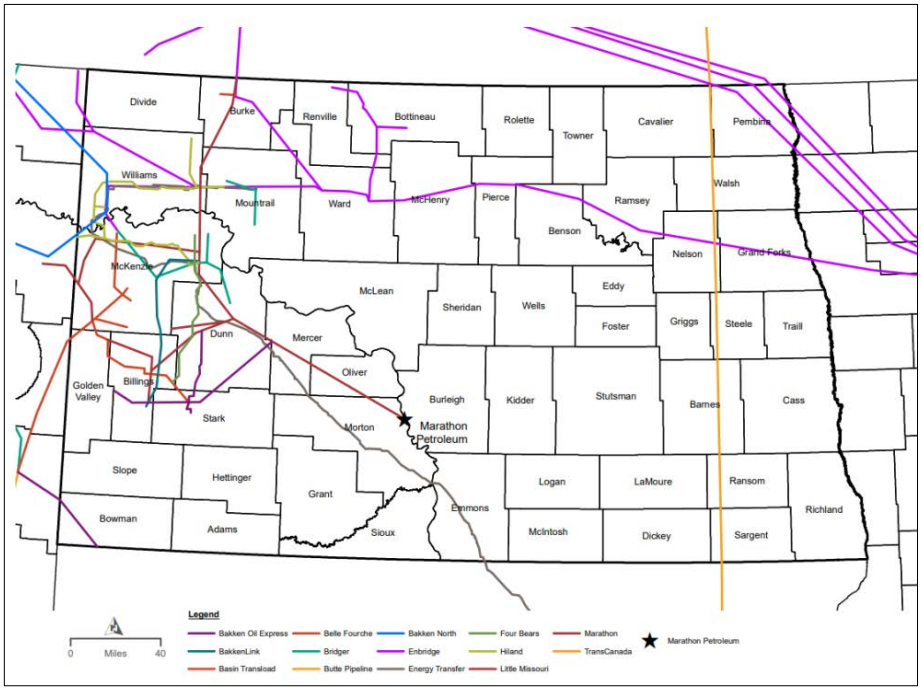
Figure 4.15-14: Spatial Extent for Transportation Incident

Resource	Extent
Public	Local
First Responders	Regional
Delivery of Service and Continuity of Operations	Regional
Property, Facilities, and Infrastructure	Regional
Environment	Local
State Economy	Regional
Public Confidence in the State's Governance	Statewide

Figure 4.15-15 shows crude oil pipelines in the state. The North Dakota Pipeline Authority indicated that about 75 percent of crude oil produced in the Bakken is exported by pipeline to out of state refineries. The expansion of pipelines has reduced the need to transport crude oil on trucks to rail yards and then on freight trains to refineries (North Dakota Freight & Rail Plan, 2023). Since the last plan, pipelines that connect oilfields to terminals or large regional pipelines have expanded pipeline mileage, which decreases the number of large tanker trucks in western North Dakota roads.

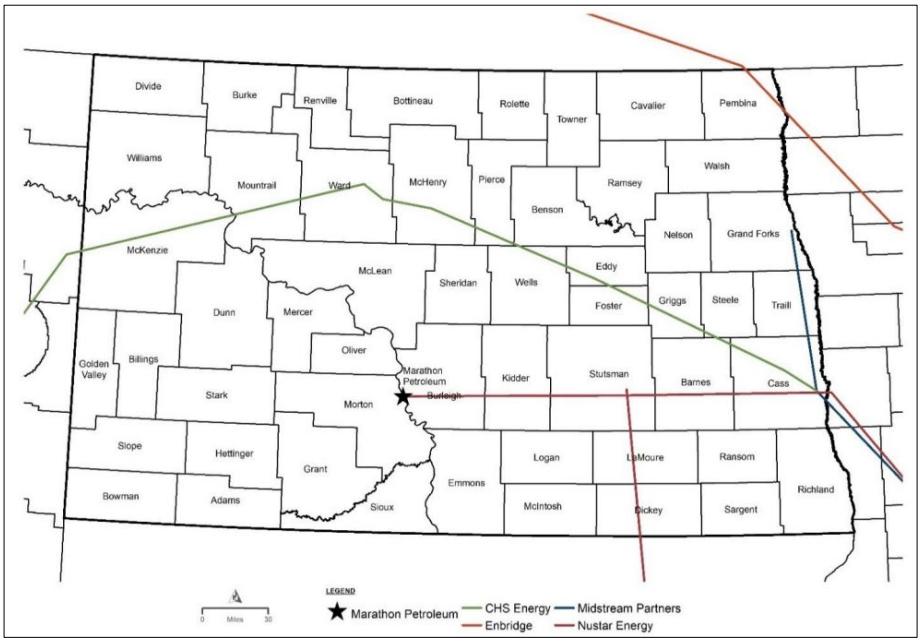
Figure 4.15-16 shows the network of refined product pipelines that transfer products such as jet fuel and gasoline to major users or storage facilities for distribution.

Figure 4.15-15: Crude Oil Pipeline Network in North Dakota



Source: North Dakota Pipeline Authority, 2023

Figure 4.15-16: Refined Product Network in North Dakota

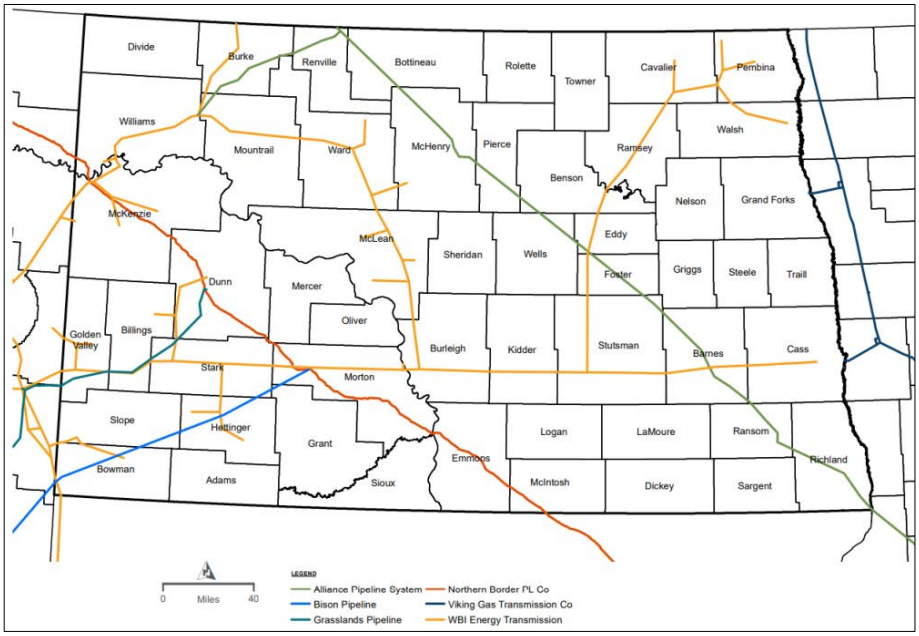


Source: North Dakota Pipeline Authority, 2023

Figure 4.15-17 shows the natural gas pipeline network in the state, which has expanded to 33 processing facilities producing 4 billion metric cubic feet a day as of 2021 (North Dakota Freight & Rail Plan, 2023). These pipelines operate at a higher pressure than crude oil pipelines.

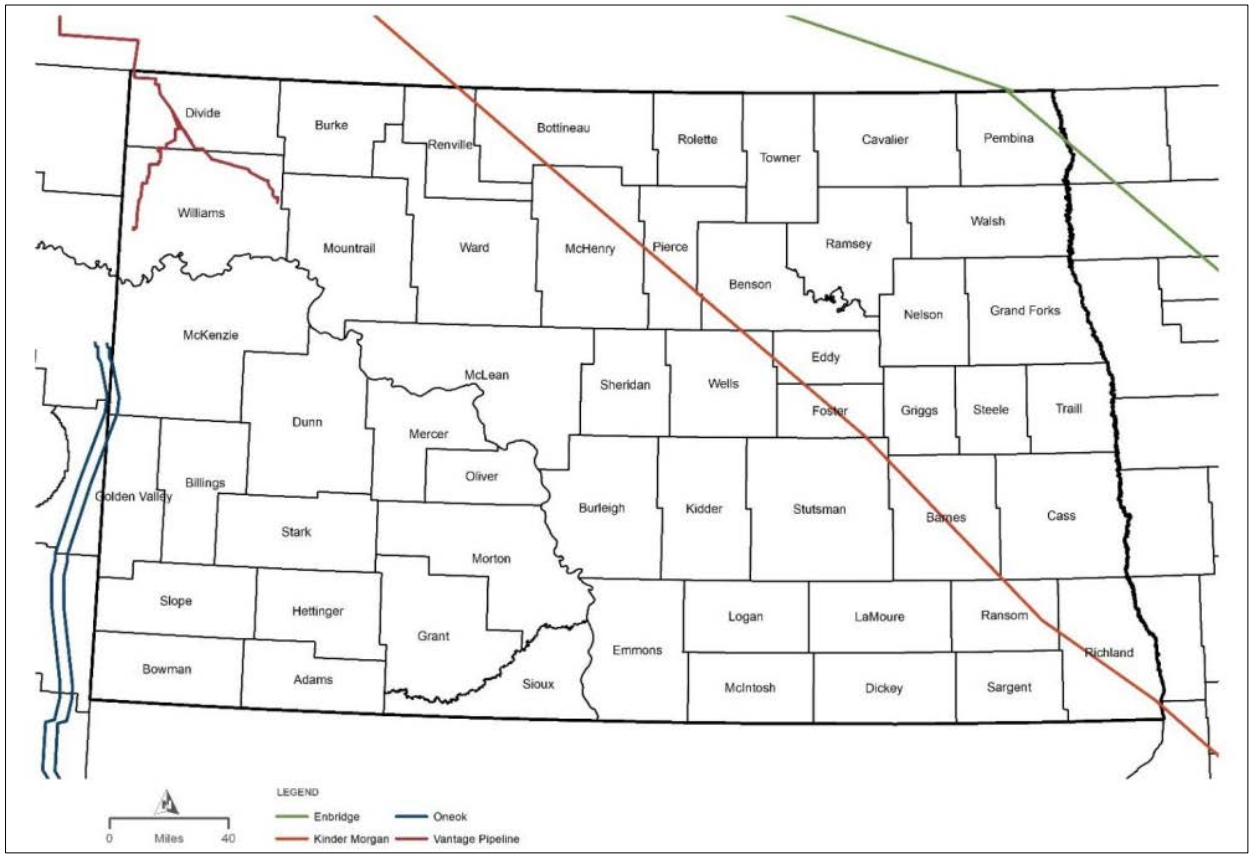
Figure 4.15-18 shows the pipelines that transport natural gas liquids such as propane and ethane.

Figure 4.15-17: Natural Gas Pipeline Network in North Dakota



Source: North Dakota Pipeline Authority, 2023

Figure 4.15-18: Natural Gas Liquids Network in North Dakota

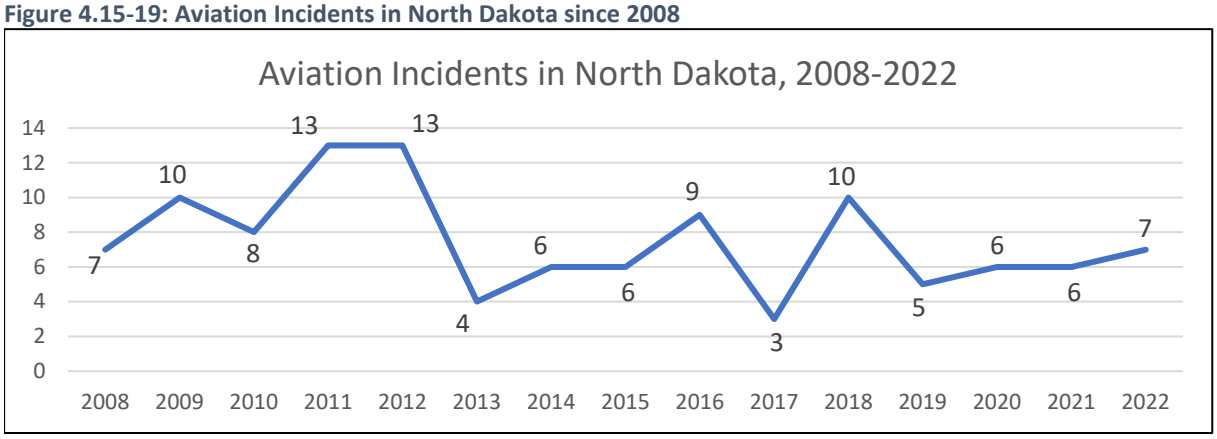


Source: North Dakota Pipeline Authority, 2023

4.15.1.4 Probability

Approximately 2,200 aircraft are based in North Dakota, a slight increase over 2018, but pilots living in the state have increased from about 1,000 to 3,964 plus 1,388 remote pilots. Commercial airline passengers are about the same as the last plan after a drop off from COVID-19 restrictions. About four million acres of farmland are treated with aerial application each year as of 2022 (North Dakota State Aeronautics Commission, 2023). Despite an increase in planes and pilots since 2010, air incidents, shown in **Figure 4.15-19**, have not experienced significant increases.

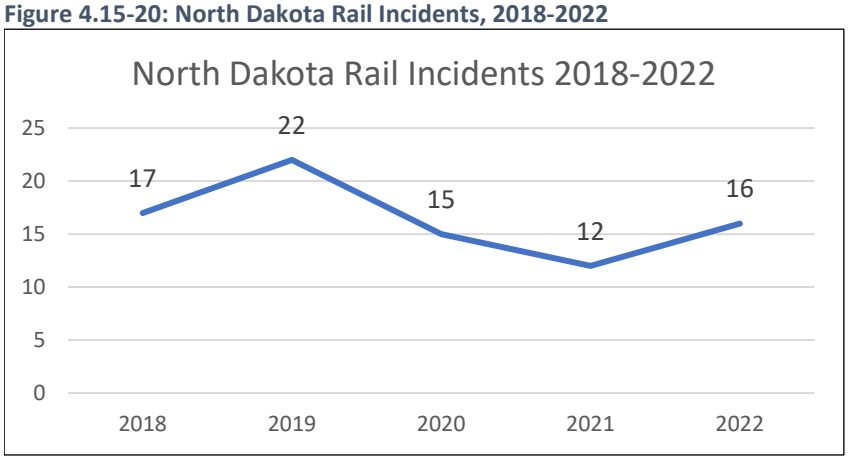
Figure 4.15-19: Aviation Incidents in North Dakota since 2008



Source: National Transportation Safety Board, 2023

Rail incidents are in decline in the state, as shown in **Figure 4.15-20** (FRA, 2023). Nationally, there are about three derailments a day, and incidents are down 44 percent since 2000. In 2022, 1,164 incidents resulted in one death and 16 injuries nationally. Most rail derailments occur in rail yards where trains are moving slowly. Technology has allowed railroads to identify issues with railcars and tracks not obvious to the human eye. While improved braking, additional safety equipment, and grade separations at populated crossings have helped to reduce incidents in recent years (Hernandez, 2023). Railroad trespass of private railroad property is the leading cause of rail-related deaths and is increasing nationwide (FRA, 2018). Most trespassers indicate they are knowingly trespassing for convenience, often because parking or bus stops makes waiting or going around stopped trains inconvenient.

Figure 4.15-20: North Dakota Rail Incidents, 2018-2022



Source: Federal Railroad Administration, 2023

Figure 4.15-21 shows railroad trespass casualties in North Dakota (FRA, 2023). While these numbers are low when compared with other states, they are on the increase, with a projected 10 incidents for 2023. This would result in nearly double the average for the plan update period over 2022 and 2023.

Figure 4.15-22 shows fatal motor vehicle accidents in the state reported to the National Highway Traffic Safety Administration (NHTSA, 2023). During the plan update period of 2018 to 2022, there was an average of 93 fatal accidents per year with a slight decrease since the last plan update.

Motor vehicle incidents have been generally decreasing since the last plan, with crash rates, fatalities, and injuries decreasing between 2018-2021, as shown in **Figure 4.15-23**. However, there were fewer miles driven in 2020, due to COVID-19 restrictions (ND DOT, 2023). Which likely also resulted in the slight reduction in fatal accidents noted on the graph at Figure 4.15-22.

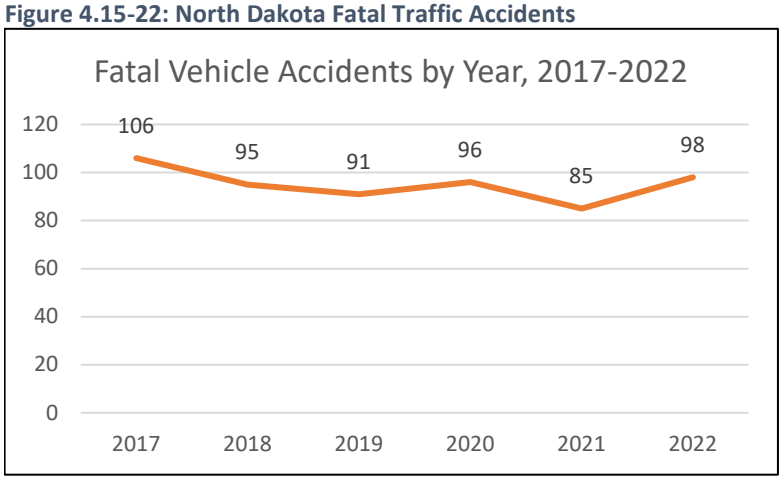
Figure 4.15-24 shows that most of those accidents are single-vehicle accidents (National Highway Traffic Safety Administration, 2023).

Figure 4.15-21: North Dakota Rail Trespass Casualties

County	2018	2019	2020	2021	2022	Jan-June 2023
Cass	1	2	2	2	3	2
Grand Forks	1	1	0	0	0	0
Burleigh	1	0	0	2	2	2
Ramsey	1	0	0	0	0	0
Stark	1	0	0	0	0	0
Ward	1	0	0	3	4	1
Barnes	0	1	1	0	0	0
Total	**6**	**4**	**3**	**5**	**9**	**5**

Source: Federal Railroad Administration, 2023

Figure 4.15-22: North Dakota Fatal Traffic Accidents



Source: National Highway Traffic Safety Administration, 2023

Figure 4.15-23: Annualized Motor Vehicle Crash Rates

Years	Crashes	Fatalities	Injuries
2012-2021	14,670.9	121.9	4,577.8
2018-2021	11,967.0	101.5	3,965.3
2013-2022	13,909	115	4,423

Source: North Dakota Department of Transportation, 2022

Figure 4.15-24: State Fatal Traffic Accident Type, 2017-2022

Single Vehicle	Two Vehicles	More than 2 Vehicles
1,116	680	96

Source: National Highway Traffic Safety Administration, 2023

One factor that leads to the potential of accidents is more vehicles on the road and the miles driven in these vehicles (North Dakota Department of Transportation, 2022). This data is shown in **Figure 4.15-25**. It shows that since the last plan update period there have been more vehicles on the road, but that they are driving fewer miles, thus reducing the amount of time that vehicles are present on the roadway to have an accident.

Information about the probability of pipeline incidents is shown in **Figure 4.15-26** to **Figure 4.15-28**.

Figure 4.15-26 shows the annual reported pipeline incidents in the state as reported to the Pipeline and Hazardous Materials Safety Administration (PMHSA). The number of incidents generally decreased annually during the plan update period, averaging 8 per year.

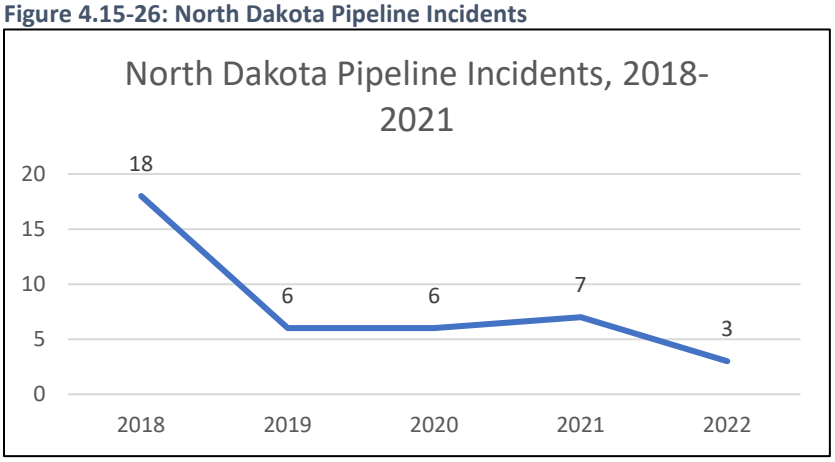
Figure 4.15-27 shows the incidents reported to PMHSA as of February 2023. During that period there was a single fatality and 40 people were evacuated (PMHSA, 2023). Equipment failure was the cause of 24 of the 41 incidents. DAPL-ETCO Operations Management was responsible for seven (17 percent) of the incidents while Summit Midstream Partners had four.

Figure 4.15-25: North Dakota Vehicles and Miles

Year	Vehicle Miles (Millions)	Vehicles
2018	9,866	944,000
2019	9,859	949,000
2020	8,741	932,000
2021	9,293	951,000
Average 2014-17	9,990	911,500
Average 2018-21	9,440	944,000

Source: North Dakota Department of Transportation, 2022

Figure 4.15-26: North Dakota Pipeline Incidents



Source: PMHSA, 2023

Figure 4.15-27: PMHSA Pipeline Incidents, 2018-February 2023

Date	Cause	Deaths	Evac.	Ignite	Commodity	Vol.	Pipeline Operator
1/4/19	Impact	0	40	YES	Natural Gas	7	NO. STATES POWER OF MN
1/18/23	Unknown	1	2	YES	Natural Gas	8.21	MT - DAKOTA UTILITIES CO
1/3/18	Equip. Failure	0	0	NO	Crude Oil	0	TESORO HP PIPELINE
1/8/18	Impact	0	0	NO	Ref. Petro	0	MAGELLAN PIPELINE CO
1/9/18	Impact	0	0	NO	Crude Oil	0	NORTH DAKOTA PIPELINE
1/8/18	Equip. Failure	0	0	NO	Crude Oil	0.5	BRIDGER PIPELINE LLC
1/10/18	Human Error	0	0	NO	Crude Oil	0	DAPL-ETCO OPER. MGMT
1/17/18	Human Error	0	0	NO	Crude Oil	0	TESORO HP PIPELINE
1/23/18	Equip. Failure	0	0	NO	Crude Oil	0.4	TESORO HP PIPELINE

Date	Cause	Deaths	Evac.	Ignite	Commodity	Vol.	Pipeline Operator
1/23/18	Equip. Failure	0	0	NO	Crude Oil	0	HILAND CRUDE, LLC
2/18/18	Equip. Failure	0	0	YES	Ref. Petro	510	MAGELLAN PIPELINE CO
2/28/18	Equip. Failure	0	0	NO	Crude Oil	0	DAPL-ETCO OPER. MGMT
3/5/18	Equip. Failure	0	0	NO	Crude Oil	0	PHILLIPS 66 PIPELINE LLC
4/12/18	Equip. Failure	0	0	NO	Crude Oil	0	SUMMIT MIDSTREAM
3/15/18	Equip. Failure	0	0	NO	Crude Oil	0	PHILLIPS 66 PIPELINE LLC
5/30/18	Equip. Failure	0	0	NO	Crude Oil	0	DAPL-ETCO OPER. MGMT
6/10/18	Equip. Failure	0	0	NO	Crude Oil	0	PHILLIPS 66 PIPELINE LLC
6/23/18	Equip. Failure	0	0	NO	Crude Oil	0	HILAND CRUDE, LLC
7/29/18	Equip. Failure	0	0	NO	Crude Oil	0	SUMMIT MIDSTREAM
11/4/18	Mech. Puncture	0	0	NO	Crude Oil	15	AMER. MIDSTREAM BAKKEN
3/7/19	Equip. Failure	0	0	NO	Crude Oil	0	SUMMIT MIDSTREAM
5/20/19	Corrosion	0	0	NO	Crude Oil	0	HILAND CRUDE, LLC
7/8/19	Equip. Failure	0	0	NO	Crude Oil	2	BRIDGER PIPELINE LLC
11/8/19	Equip. Failure	0	0	NO	Crude Oil	0	TESORO LOGISTICS
10/29/19	Material Failure	0	0	NO	Crude Oil	0	TC OIL PIPELINE
4/3/20	Equip. Failure	0	0	NO	Crude Oil	0	TC OIL PIPELINE
5/6/20	Impact	0	0	NO	Crude Oil	0	ENBRIDGE ENERGY
5/13/20	Equip. Failure	0	0	NO	Crude Oil	0	DAPL-ETCO OPER. MGMT
6/15/20	Equip. Failure	0	0	NO	Ref. Petro	0	CENEX PIPELINE LLC
10/22/20	Equip. Failure	0	0	NO	Crude Oil	0	TC OIL PIPELINE
3/18/21	Equip. Failure	0	0	NO	Ref. Petro	0	CENEX PIPELINE LLC
3/20/21	Corrosion	0	0	NO	Crude Oil	135	SUMMIT MIDSTREAM
1/4/20	Impact	0	0	YES	Crude Oil	0	DAKOTA MIDSTREAM
5/11/21	Human Error	0	0	NO	Ref. Petro	0	CENEX PIPELINE LLC
6/14/21	Human Error	0	0	YES	Crude Oil	0	DAPL-ETCO OPER. MGMT
6/22/21	Human Error	0	0	YES	Crude Oil	0.1	NORTH DAKOTA PIPELINE
9/28/21	Equip. Failure	0	0	NO	Crude Oil	0	DAPL-ETCO OPER. MGMT
11/5/21	Equip. Failure	0	0	NO	Crude Oil	0	PLAINS PIPELINE, L.P.

Date	Cause	Deaths	Evac.	Ignite	Commodity	Vol.	Pipeline Operator
4/25/22	Equip. Failure	0	0	NO	Crude Oil	0	SAVAGE BAKK. CONNECTOR
6/10/22	Impact	0	0	NO	Ref. Petro	18	NUSTAR PIPELINE
11/21/22	Other	0	0	NO	Crude Oil	0	DAPL-ETCO OPER. MGMT
Totals		**1**	**42**			**696.21**	

Source: PMHSA, 2023; U.S. Coast Guard, 2023

Figure 4.15-28 and **Figure 4.15-29** show data reported to the National Response Center about pipeline incidents and tank incidents. Tank data is included because many of the pipelines store material in tanks prior to shipping, midstream, and after transportation ahead of processing, and are thus part of the transportation process. Gathering (16) and Transmission (13) are the most common types of pipelines to leak hazardous material (NRC, 2023). Storage tanks (3) are the most common tanks to leak hazardous material, but incidents are relatively evenly distributed among tank types.

Figure 4.15-28: NRC Pipeline Incidents, 2018-2022

Pipeline Type	2018	2019	2020	2021	2022	Total
Distribution	0	2	2	2	0	6
Flow	0	2	1	0	0	3
Gathering	3	8	0	2	3	16
Other	1	0	0	0	1	2
Service	0	1	0	0	0	1
Station	1	0	0	0	1	2
Transfer	1	0	1	0	1	3
Transmission	2	1	4	4	2	13
Unknown	2	61	1	0	2	66

Source: U.S. Coast Guard/National Response Center, 2023

Figure 4.15-29: NRC Tank Incidents, 2018-2022

Tank Type	2022	2021	2020	2019	2018	Total
Middle Tank	1	0	0	0	1	2
Multi-Use Storage Tanks	0	0	2	0	0	2
Nurse Tank	0	2	0	0	0	2
Round Cylinder	0	0	0	1	0	1
Steel Tank	1	0	0	0	1	2
Storage Tank	0	2	1	0	0	3
Tote	0	0	0	1	0	1
Underground Storage	0	0	1	0	0	1
Waste Oil Tank	0	0	0	1	0	1

Source: U.S. Coast Guard/National Response Center, 2023

4.15.1.5 Warning Time and Duration

While the conditions that may lead to a mass-casualty traffic incident may have some level of predictability, the incidents themselves give little warning. Rough weather, fog, slippery streets, heavy traffic, and high winds are some of the conditions that have led to traffic incidents in the state. Other incidents give little warning. Human error, equipment malfunction, and distracted driving can provide little warning. The incidents themselves usually take seconds or minutes to occur, but the time of road, rail, and pipeline closures can cost money and time.

Atmospheric conditions impacting pilots can deteriorate quickly and be short in duration. Adverse weather conditions can lead to the grounding of airplanes and runways that delay passengers, commercial pilots, and cargo. Human error is the leading cause of traffic incidents, but 23 percent of aviation incidents nationally are caused by weather, and about 70 percent of delays are caused by weather. This causes an estimated $3 billion in damage, injuries, delays, and increased operating costs nationally. In the air, icing can be particularly problematic. In addition to posing a risk of causing an incident, it increases operating costs with the need for de-icing, impacts the efficiency of airplane operations and creates an increased need for fuel. Small aircraft operate at clouded altitudes favorable to icing, and can be most at risk (Kulesa, 2003). The 2023 fatal incident in Morton County was likely caused by an icing event.

Unmanned Aircraft Systems (UAS or Drones) can be used to provide more data about the atmospheric conditions where commercial pilots fly, and thus improve warning time and safety information. The Northern Plains UAS test site has been selected to participate in federal pilot programs for drone technology and its use in policy and safety since 2017 (NDDOT-UAS, 2023). Drones are being studied for their use in disaster damage assessments, infrastructure inspection, and law enforcement support in addition to examining flight conditions for agricultural aviation.

NDDOT evaluates rail crossings for safety each year. In December 2021, recommendations were made to add crossing signals to 73 crossings. At that time there were still 17 crossings on public roads without safety features of any kind. These features provide warning to motor vehicle drivers that a train is approaching and often provide obstacles to entering the tracks during train crossings. Upgrading at-grade crossings to separated crossings allows both train and road traffic to cross without impeding each other (NDDOT, 2023). **Figure 4.15-30** shows the grade type and safety-feature presence of North Dakota crossings. At-grade crossings dominate with 98.2 percent of crossings. While most at grade crossings have a signal, just 20.1 percent have flashing lights, and 19.2 percent have roadway gate arms that provide an increased warning (FRA, 2023). NDDOT's Freight and Rail Plan (2023) identifies the need to reduce unmarked crossings and ensure that tracks and crossings are maintained in a state of good repair. It identifies the need to reduce separated crossing strikes by over-height vehicles through alert

Figure 4.15-30: North Dakota Rail Crossing Safety Feature Presence, 2023

Crossing Grade Type	Percent
Separated Crossing	1.8
Crossing at Grade	98.2
Safety Features at Grade	**Percent**
Signed or Signaled	95.7
Yield Signs	33.6
Mast-Mounted Flashing Lights	20.1
Roadway Gate Arms	19.2
Bells	11.7
Stop Signs	9.8
Crossbuck Assemblies	9

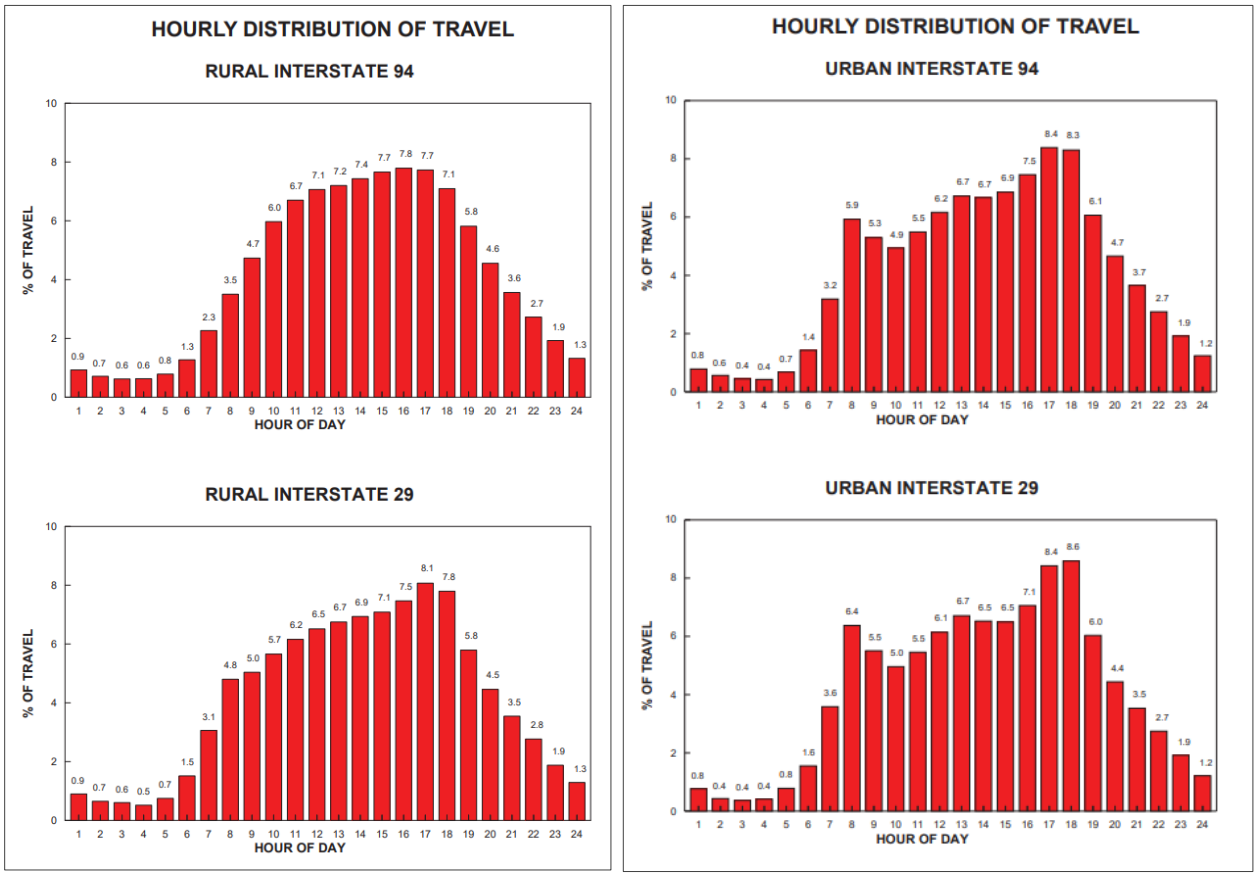
Source: Federal Railroad Administration, 2023

systems. It also identifies key challenges of enforcing weight restrictions in the winter to reduce harm, and finding funding resources for regional railroads who lack the corporate resources to improve crossings (NDDOT, 2022). The state's Highway-Rail Grade Crossing State Action Plan (2022) identifies 416 crossings removed by railroads in the state since 2016.

Motor vehicle accidents can occur at any time and with little warning, but analysis of traffic and crashes can help identify roadways and areas most at risk. The heaviest traffic corridors are on the interstates of I-29 and I-94. These are also the corridors with vehicles travelling at high rates of speed with limited expectation of the need to stop or slow quickly due to controlled access (no traffic signals, intersections, or property access). Crashes on Interstates are more likely to occur at high rates of speed due to the higher legal speed limits on these stretches.

Figure 4.15-31 shows the distribution of traffic by hour on the North Dakota interstates broken into rural and urban stretches. Both show heavier traffic between 8 a.m. and 7 p.m., with peak traffic between 5 p.m. and 6 p.m. (ND DOT, 2022). Urban overnight traffic has lower volumes than its rural counterparts, but higher peaks during rush hours.

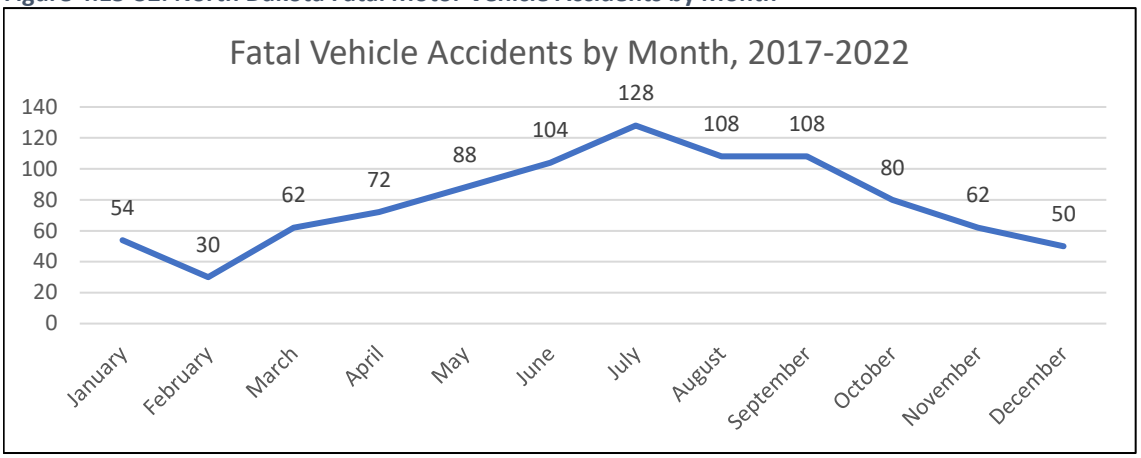
Figure 4.15-31: North Dakota Interstate Traffic Distribution, 2022



Source: North Dakota Department of Transportation, 2022

Figure 4.15-32 presents five years of fatal crash data, looking at the date in which the accident occurred. Summer months have larger numbers of fatal accidents, despite there being longer hours of daylight and no ice on the roads due to people being out enjoying the warmer temperatures. The months when school is out, and people are travelling on the highways for summer vacation have the highest rates of fatal crashes.

Figure 4.15-32: North Dakota Fatal Motor Vehicle Accidents by Month



Source: National Highway Traffic Safety Administration, 2023

NDDOT is applying technology to help increase drivers' ability to predict road closures from accidents and provide warning about hazardous conditions. Traffic cameras, construction, road conditions and closures are all reported and visualized at NDDOT's website (https://travel.dot.nd.gov/). **Figure 4.15-33** shows an image taken by traffic cameras, during morning rush hour in Fargo at the I-29 and I-94 exchange in September 2023.

Figure 4.15-33: Traffic Camera Photo at I-29 and I-94 in Fargo in September 2023

Source: North Dakota Department of Transportation, 2023

Developing this resource lets drivers make informed choices about routes, and departures that are less likely to put then at risk for accidents and delays and allows logistics providers the opportunity to adapt routes and communicate to drivers to reduce the impact on their business. The technology also allows weather conditions to be monitored so that alerts and advisories can be issued (ND DOT, 2022). Since 2020, North Dakota has participated in the Applications of Enterprise GIS for Transportation study with other states and the federal government designed to improve data on road safety and conditions, to reduce road hazards that may lead to mass-casualty incidents. NDDOT also conducted a 2018 study on snow and ice control on its highways. It examined how new technologies and route optimization might improve snow removal while saving the state money (NDDOT Snow and Ice Control, 2018). These actions will reduce delays and improve data and warning time for drivers.

In August 2023, PHMSA indicated it would be strengthening regulations of pipelines requiring more safety protocols and improved communication with emergency responders and the public, to improve the likelihood of warning time to the public before a dangerous incident (Reuters, 2023). The emergence of AI technologies and drones should improve monitoring capabilities in pipelines, improving warning times and decreasing detection times for events.

4.15.2 Consequence and Vulnerability Loss Analysis

This section describes the consequences and vulnerabilities of a transportation incident. Both consequences and vulnerability will be discussed in this section.

A consequence is the "degree of debilitating impact that would be caused by the incapacity or destruction of critical infrastructure or a critical function." Consequences can be tangible impacts to buildings or systems or intangible impacts on processes, business, or reputation. Consequences include debilitating impacts, such as the loss of critical functions, data, or public confidence (FEMA EMI, 2023). It also includes cascading effects that may have an effect on functionality of critical services such as the loss of service of a utility or communications.

Vulnerability "is susceptibility to physical injury, harm, damage, or economic loss." It considers the extent of injury and damages that may result from a hazard event of a given intensity in a given area (FEMA EMI, 2023). This may be a geographic, social, or economic feature that makes harm from a hazard more likely or more intense.

4.15.2.1 Human Loss

Human loss and the loss of physical transportation assets are the most profound consequences of significant transportation incidents (NTSB, 2023). **Figure 4.15-34** shows data related to the human consequences and changes in aviation incidents comparing the data periods for the current and last plan

Figure 4.15-34: Changes in Aviation Incident Human Consequences

Data Years	Incidents	Fatalities	Minor Injuries	Uninjured	Seriously Injured
2013-17	28	6	4	27	7
2018-22	34	8	17	28	7
Change	21%	33%	325%	4%	0%

Source: National Transportation Safety Board, 2023

update. Incidents, fatalities, minor injuries, and those uninjured are up, with minor injuries showing the largest increase of 325 percent, while serious injuries are unchanged (FRA, 2023). Humans most susceptible to loss are pilots and passengers in small private or commercial aircraft, as these aircraft are more likely to experience trouble and crash.

Railroad accidents are examined by cause and consequence in **Figure 4.15-35**. There was just one life lost in a railroad incident in the state since 2018. This data does not include train/vehicle accidents. However, in areas where rail lines are near populated areas, the risk for injuries or death from a rail incident is higher, especially for a transportation incident that rises to the level of needing state resource.

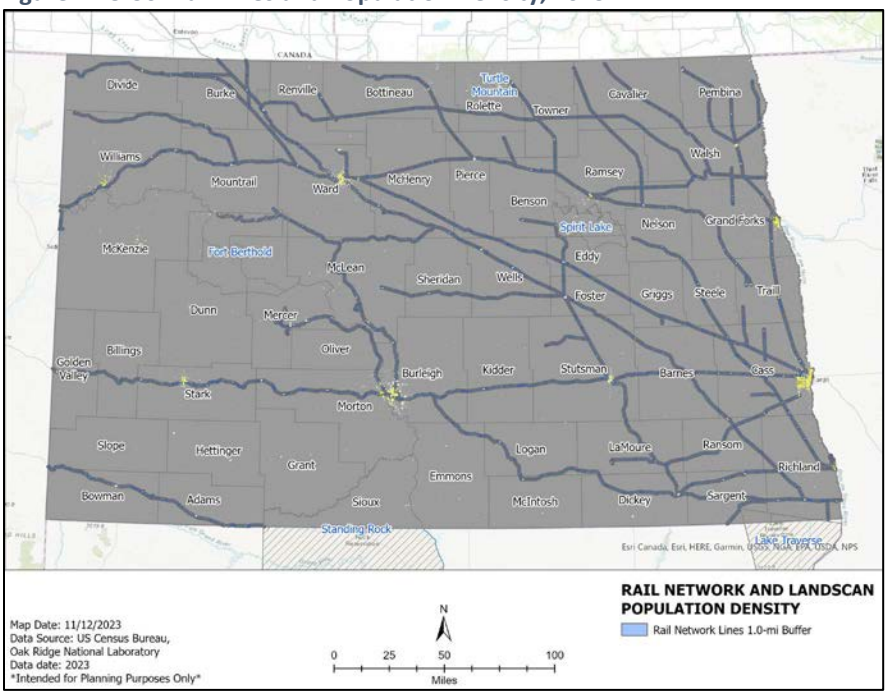
Figure 4.15-35: Railroad Incident Consequences by Cause, 2018-2021

Cause	Incidents	Fatalities	Injured	Reported Damage
Equipment	6	0	0	$ 953,077.00
Human	19	0	0	$ 820,595.00
Miscellaneous	3	1	0	$ 1,254,402.00
Track	7	0	0	$ 2,379,314.00
Annualized	7	0.2	0	$ 1,081,477.60

Source: Federal Railroad Association, 2023

Figure 4.15-36 displays population density and rail lines in the state. In areas like Minot, Fargo, Williston, and Grand Forks there are obvious areas of increased risks. But a similar juxtaposition between people and rail lines exists in Devils Lake, Dickinson, Jamestown, Grafton, Wahpeton, and Bowman.

Figure 4.15-36: Rail Lines and Population Density, 2023



Source: Oak Ridge National Laboratories, 2023, ACS, 2023

Railroad workers in rail yards are the most susceptible to human consequence due to working in an environment of moving trains and freight.

Figure 4.15-37 shows the human consequences from motor vehicle accidents between 2017 and 2021 (NDDOT, 2022). During that span, the state lost 522 motor vehicle occupants in accidents for an average of 104.4 a year and another 4,058 injured per year.

Figure 4.15-38 and **Figure 4.15-39** relate to factors of vulnerability related to traffic incidents.

Weather conditions that impact the safety of the road surface or impact the visibility of drivers are often factors in fatal accidents, and especially in mass-casualty events (NDDOT, 2022). Even clouds, wildfire smoke, and heavy winds can cause transportation incidents. Clouds, snow, rain, and fog/smog/smoke are the top contributing weather conditions to North Dakota fatalities, as shown in **Figure 4.15-38**.

Behavior or transportation mode can also make a person more vulnerable to traffic incidents. Not electing to follow laws around safety restraint use, intoxicated driving and speed contributes heavily to fatalities in the state, as shown in **Figure 4.15-39**.

Nationally, 50 percent of passenger vehicle fatalities occur to unrestrained drivers. In North Dakota, that number has recently been higher, around 58.6 percent (NDDOT, 2023). Alcohol was the second-highest factor contributing to human vulnerability in transportation incidents, noted as a contributing factor in 35.9 percent of accidents, and speed third with more than a quarter of fatal accidents citing it as a factor (NDDOT, 2023). Motorcycles, pedestrians, and bicycles had smaller numbers of contributions to fatalities, but drivers using these methods expose their bodies to direct contact, placing them in a more vulnerable position to sustain greater harm.

Figure 4.15-37: Motor Vehicle Human Consequences, 2017-2021

Year	Crashes	Fatalities	Injuries
2022	10,734	98	3,763
2021	9,585	101	3,947
2020	8,820	100	3,426
2019	14,221	100	4,258
2018	15,242	105	4,230
2017	15,280	116	4,432

Source: NDDOT, 2022

Figure 4.14-38: Weather Conditions Contributing to Vehicle Fatalities, 2017-2021

Conditions	Crashes
Cloudy	52
Snow	13
Fog, Smog, Smoke	11
Rain (Mist)	11
Blowing Snow	10
Freezing Rain or Drizzle	5
Severe Crosswinds	3
Sleet, Hail (Freezing)	1

Source: NDDOT, 2022

Figure 4.15-39: Risk Factors in Motor Vehicle Accidents 2020-2022

Factor	2020	2021	2022
Seatbelt Not Worn	60.3%	46.3%	69.1%
Alcohol-Involved	38.5%	31.8%	37.5%
Speed-Related	24.0%	28.7%	25.5%
Motorcycle	17.0%	7.9%	21.4%
Pedestrian	8.0%	9.9%	6.1%
Bicycle	1.0%	1.0%	1.0%

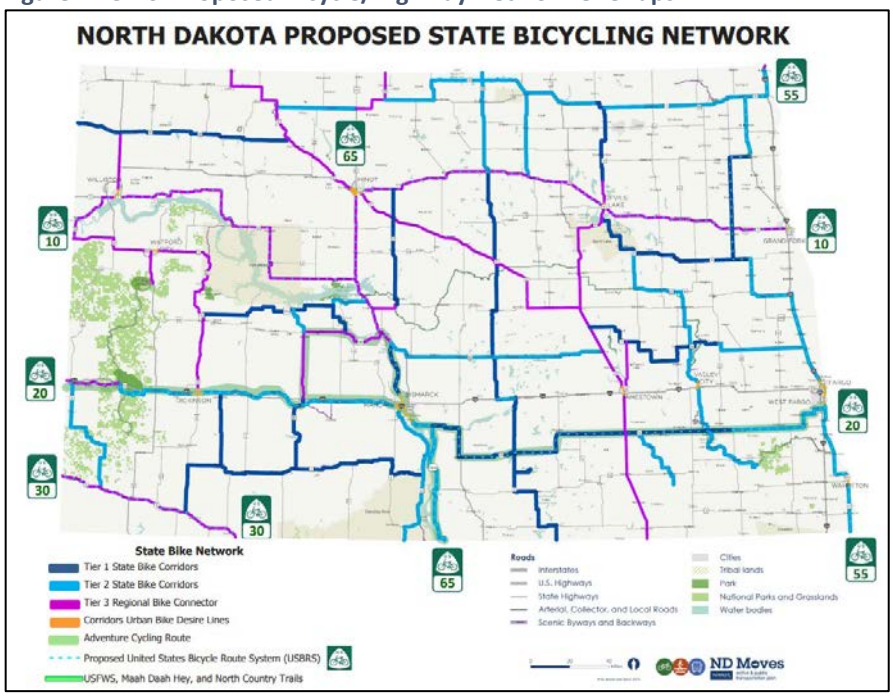
Source: NDDOT, 2023

Figure 4.15-40 shows the proposed bicycling network in the state as published by the NDDOT (ND Moves, 2023). Route 30 is part of the established US Bicycle Route System. Many of these routes are already frequented by cyclists, placing motor vehicles and cyclists on the same corridors. Establishing a set route would encourage group rides and increase the likelihood of a mass-casualty event.

Figure 4.15-41 shows the areas of CEJST exceedance by Census tract (US Council on Environmental Quality, 2023) along with motor vehicle fatalities by county (NDDOT, 2023) between 2017 and 2022. Western Fort Berthold and Fargo each have areas where there are a large number of fatalities related to climate and economic vulnerability.

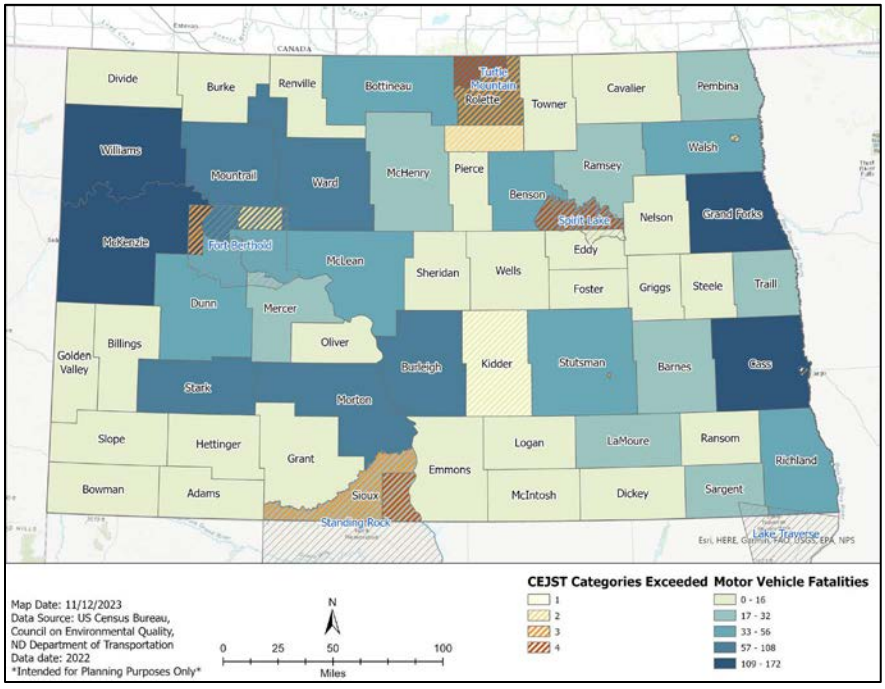
Another aspect of human vulnerability to consider when it comes to transportation incidents is access to healthcare (American Community Survey, 2023). Areas where there are large numbers or large percentages of uninsured residents will see prolonged loss of productivity as injuries from transportation incidents are unable to be properly attended.

Figure 4.15-40: Proposed Bicycle/Highway Network Overlaps



Source: NDDOT, 2023

Figure 4.15-41: CEJST Exceedance and Motor Vehicle Fatalities, 2022



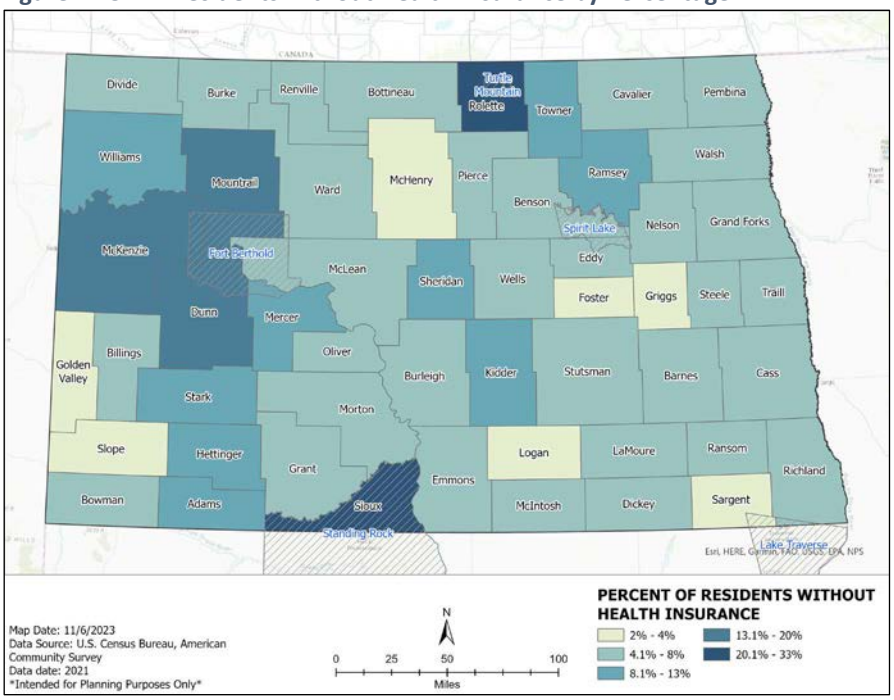
Source: Council in Environmental Quality, 2023; NDDOT, 2022

Figure 4.15-42 and **Figure 4.15-43** show the American Community Survey data (2023) for North Dakotans who reported not having health insurance.

Figure 4.15-42. Counties such as Sioux (33.2 percent), Rolette (27.8 percent), and Dunn (19.6 percent) have between 1 in 5 and 1 in 3 residents without access to healthcare which can have a substantial impact on the overall well-being of the residents in the county.

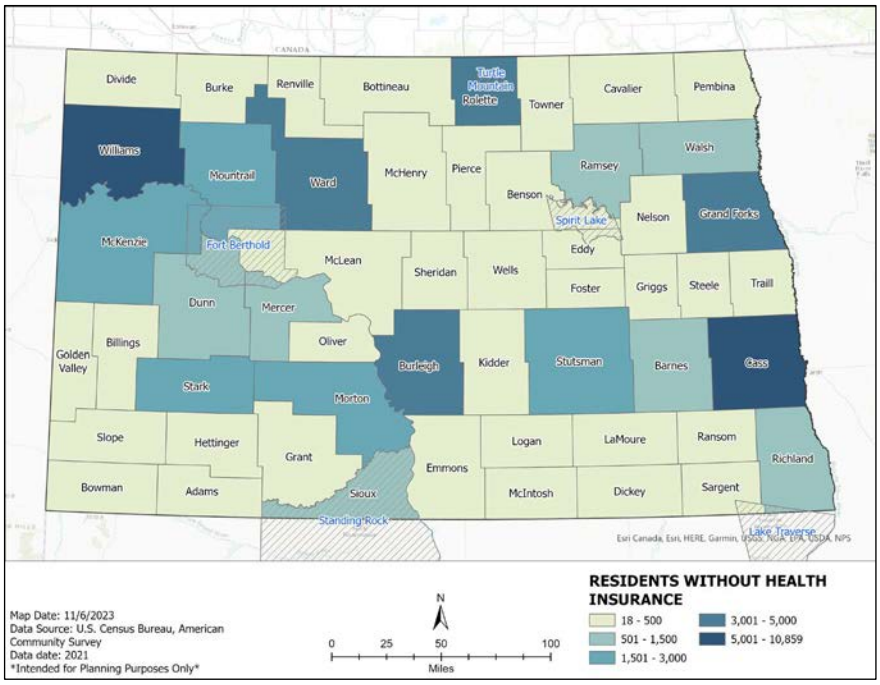
Figure 4.15-43. Other Counties like Cass (10,859), Williams (5,071), Burleigh (4,873), and Grand Forks (4,483) have large numbers of residents without health insurance who may be unable to access the healthcare needed from a transportation incident.

Figure 4.15-42: Residents without Health Insurance by Percentage



Source: ACS, 2023

Figure 4.15-43: Residents without Health Insurance by Total



Source: ACS, 2023

The National Highway Traffic Safety Administration and an increasing number of state laws around the nation have recognized the risks of distracted driving. Nationally, distracted driving costs 3,522 lives in 2021 (NHTSA, 2022). North Dakota's law prohibits text messaging, emailing, and instant messaging or accessing the web while driving. Adult drivers are allowed to use GPS navigation, receive phone calls, obtain emergency assistance, or operate a phone in a hands-free mode (Nolo Law, 2023). Additionally, it restricts drivers under the age of 18 from using cell phones while driving even in hands-free mode.

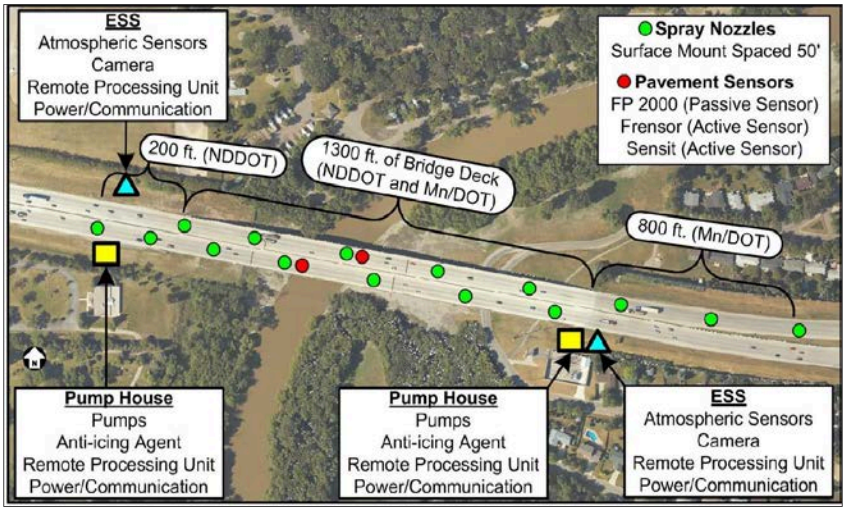
The North Dakota Department of Transportation (NDDOT) introduced Safety Corridors in 2019 as part of North Dakota's Vision Zero strategy to reduce motor vehicle fatalities and serious injuries to zero. A safety corridor is a designated section of highway that includes enhanced safety features and an increase in law enforcement to remind drivers that they are responsible for obeying all traffic laws and posted speed limits. The Safety Corridor locations are selected based on highways with a higher number of vehicle crashes. The purpose is to utilize engineering and technological solutions to change dangerous driving behavior and reduce the number of crashes on state highways.

Safety Corridors are located at the following locations:

- US 85 Watford City to ND 68: 14-mile Safety Corridor
- US 52 Brooks Junction to Velva: 35-mile Safety Corridor
- US 83 Bismarck to Washburn: 36-mile Safety Corridor
- US 85 Belfield to Watford City: 70-mile Safety Corridor

NDDOT has installed two fixed automated spray technology (FAST) systems. One system is installed at the Interstate 29 (I-29) Buxton Bridge (near Buxton), while the second installation is at the Interstate 94 (I-94) Red River Bridge between Fargo and Moorhead, Minnesota. An evaluation of the FAST system, conducted in 2009, found that significant crash reductions were observed at the two locations after the systems were installed (Birst & Smadi, 2009). After 6.5 winter season in use, the Buxton Bridge location saw a 66% reduction in total crashes, with similar reductions on property damages and nearly a 75% reduction in injury-related crashes. After 9.5 winter seasons in use, the Red River Bridge location saw a 50% reduction in total crashes along the North Dakota and Minnesota portions of its reach. These resulted in significant reductions in societal costs (resulting from vehicle crashes) and in transportation agency costs (reduced maintenance activities).

Figure 4.15-44: Fixed Automated Spray Technology, on Red River Bridge



Source: Birst &Smadi, 2009

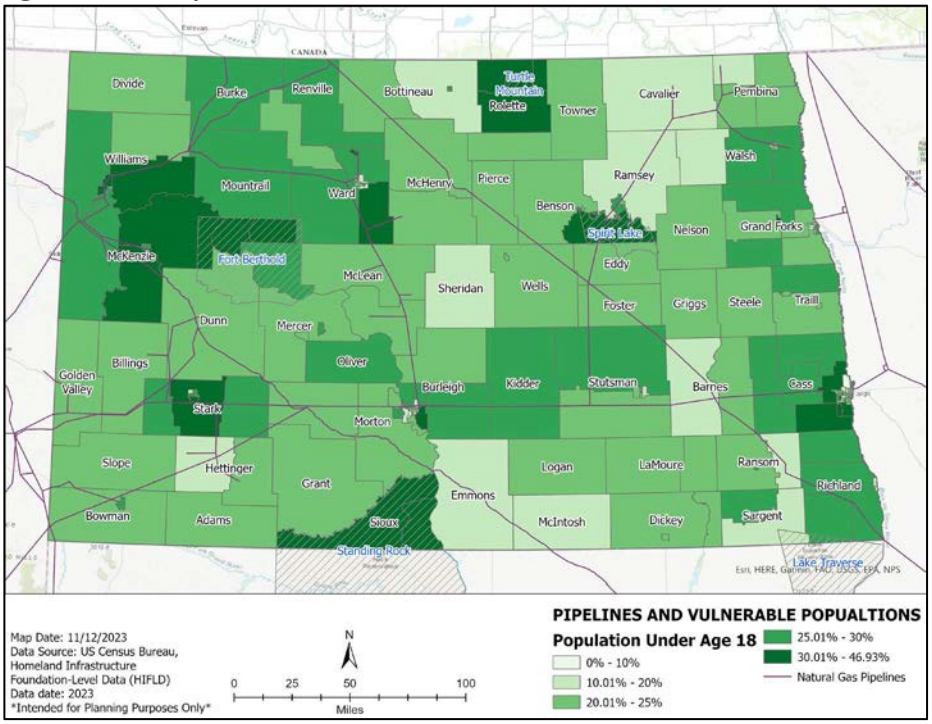
Children and elderly residents are most at risk from exposure to chemicals leaking from pipelines. They are also less likely to recognize a leak due to lack of knowledge for children, and declining sensory skills among the elderly (Weber et al., 2022). Children and the elderly are also more likely to need assistance in evacuation.

Figure 4.15-45 and **Figure 4.15-46** show the rates of children and elderly along with the natural gas pipeline network in the state.

Figure 4.15-45. Urban areas, reservations and the Bakken are the areas of the state where natural gas pipelines and areas with a large number of children coincide.

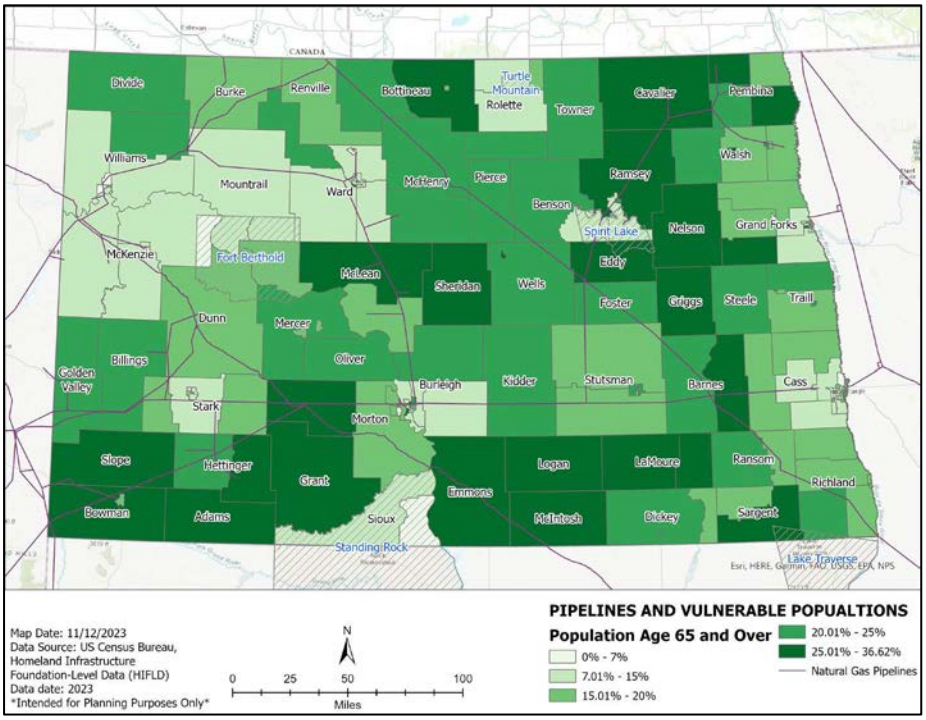
Figure 4.15-46. Among the elderly, the southwest and northeast corners of the state are the areas of concern for elderly residents and natural gas pipelines.

Figure 4.15-45: Pipelines and Children



Source: LandScan USA, 2021; Homeland Infrastructure Foundation-Level Data, 2023; ACS, 2023

Figure 4.15-46: Pipelines and Elderly Residents

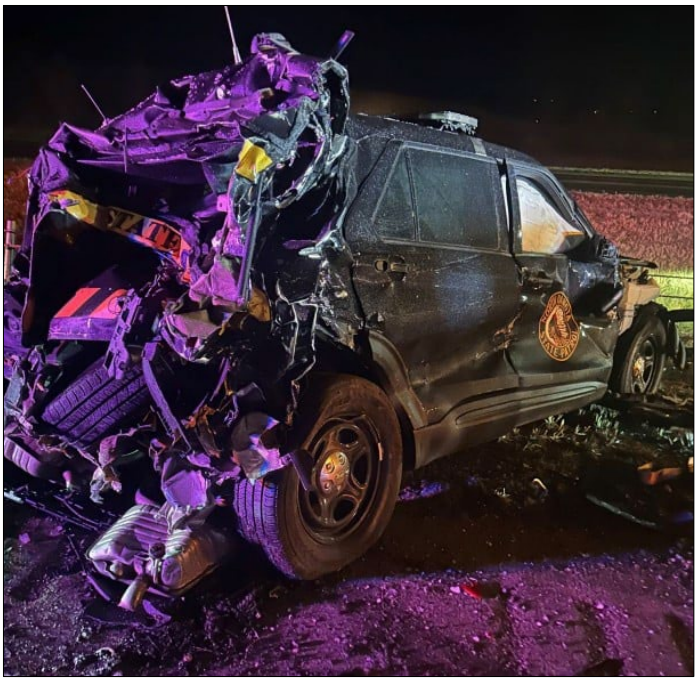


Source: LandScan USA, 2021; Homeland Infrastructure Foundation-Level Data, 2023; ACS, 2023

4.15.2.2 First Responders

First responders face the same consequences of injury or death and many of the same vulnerabilities of weather and behavior choices.

Figure 4.15-47: ND Highway Patrol vehicle after I-94 pileup.



Source: North Dakota Highway Patrol, 2022

An I-94 pileup in Stutsman County in November 2022, included a North Dakota Patrol SUV among its two-dozen vehicles on an icy night. A semi-truck jack-knifed, and the patrolman pulled to the side of the road to respond and check on the driver. He had to jump to avoid being hit by the next car to join the pileup, and his car is shown in **Figure 4.15-47**. In this event, the patrolman faced the wrath of icy roads, but also faced a vulnerability unique to his position (KVRR staff, 2022). No other person involved in the pile-up had the responsibility to leave the safety of the vehicle to check on others. Luckily, the patrolman faced neither the consequence of injury nor death.

This is one example of how first responders are often unable to avoid the conditions or the behaviors that may make them more vulnerable in a traffic incident. While the State Highway Patrol may issue warnings to avoid driving due to dangerous road conditions, first responders still must take to the road when duty calls.

First responders are often placed in the position of either pulling over a motorist responding to a traffic incident or otherwise needing to pull over to the side of the road. First responders on the side of the road are in a vulnerable position. In 2018, 16 percent of drivers said they had struck or nearly struck an emergency vehicle or first responder on the side of the road.

First responders use sirens and lights to move through traffic and through lights and laws are written to encourage other drivers to make way for response vehicles. However, responders still go through red traffic lights, speed and roll stop signs putting them at greater risk should another driver fail to yield to the emergency vehicle. Additionally, response delay can be a consequence in rural areas due to the lack of officers or paramedics available to respond. Even with mutual aid, a day with treacherous weather that impacts roads or multiple accidents in opposite areas in the same county that require response may overburden local and regional resources and lead to delays. Communities with larger numbers of responders or larger departments who can respond to mutual aid calls are less vulnerable to being overburdened by multiple traffic accidents in bad conditions.

4.15.2.3 Environment, Natural, and Cultural Resources

Wildlife-Vehicle Collisions (WVC) can have a substantial impact on traffic, just as traffic can be deadly to wildlife. While deer are the most common threat, moose, bighorn sheep and elk are also dangerous for those individuals traveling on the roads. These animals tend to be more common in the Badlands, Kildeer and Turtle Mountains and Pembina Hills, yet there was a bull elk hit in 2017, near Grand Forks (Bismarck Tribune, 2017). Pronghorn, large birds such as turkey, pheasant and grouse, livestock, coyotes, mountain lions, and raccoons are also North Dakota highway fatalities, and simply swerving to avoid contact can be deadly for North Dakota drivers and passengers.

WVCs occur most frequently at dusk or in the dark and cost the average driver $4,000 in damage. American drivers have a 1 in 116 chance of hitting an animal with their vehicle. Deer rut season in late fall is the worst time of year for WVC (Raleigh, 2020). WVC cause about 200 deaths in the United States each year, another 30,000 injuries and $8 billion in property damage to vehicles over the course of 1 to 2 million collisions, according to the Federal Highway Administration (Bradley, 2021). North Dakota ranked 13th in 2020 among states, rising in recent years.

North Dakota has begun installing wildlife underpasses in areas of known concern. The first was built near Williston near the Lewis and Clark Wildlife Management Area and is designed to accommodate moose on Highway 85 (Leier, 2023). The second wildlife underpass was constructed under Highway 85 near Watford City and the Badlands. The $38.5 million project was placed in an area where WVC was common for Badland wildlife seeking water from the Little Missouri River. It was placed in an area of known bighorn crossing and is shown in **Figure 4.15-48** (Hughes, 2021; Wilson, 2023). Both had wildlife cameras installed to monitor their effectiveness.

Figure 4.15-48: Wildlife Crossing on Highway 85 near Watford City

Source: NDGF, 2020

In the first year and half of the Watford City underpass, over 1,200 mule deer and 200 bighorn sheep used the structure (Leier, 2023). Other alternatives to keeping wildlife off roads include overpasses, fences, and lighting to serve as a deterrent. Rural areas near recreational areas or parks are most vulnerable to WVC.

Another risk to the environment brought on by transportation incidents are the leaking of gasoline from accidents into the environment and into waterways, although the direct impacts of such leaks is discussed more in-depth in the hazardous materials section 4.11.

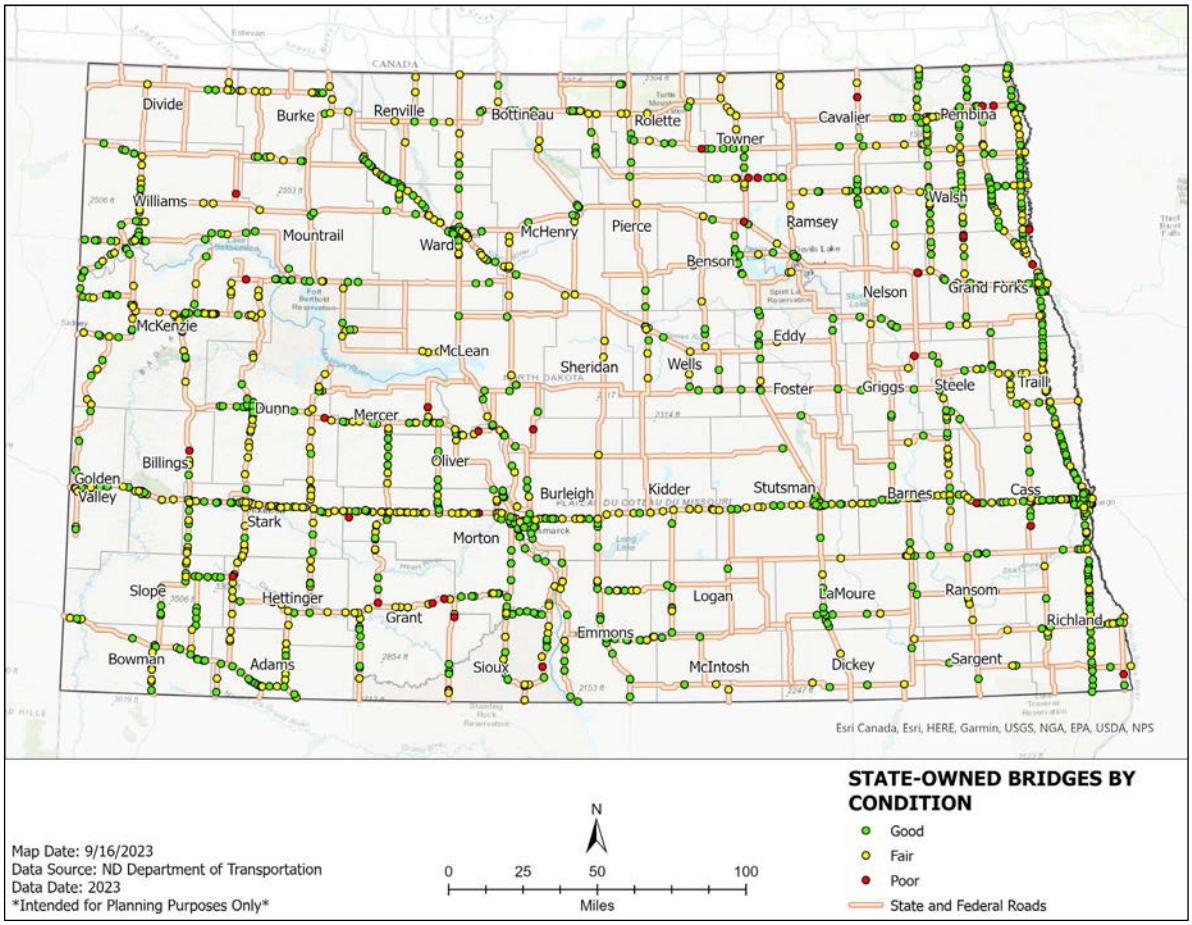
Roads and bridges can be cultural resources, creating scenic routes, passing through sacred lands, parks and fragile waterways and habitats and/or containing historic bridges. Traffic incidents can damage these resources, and can lead to their removal, as was the case with the historic bridge destroyed by a 2019 incident by an overweight truck in Northwood.

Pipelines often travel through lightly populated areas moving hazardous substances away from one location to the other. Often the environment is the chief harmed body in pipeline accidents, which can go unnoticed due to the lack of human monitoring. The damage to soil and water from these incidents can be long lasting. A 2023 study showed that crude oil pipelines had the highest environmental risk (Lu, Xi, and Qin, 2023). High-pressure lines and above-ground lines are safer because undergrounds lines face more risks related to corrosion and have fewer visual indications of failure and high-pressure lines get more attention during construction and maintenance due to risk.

4.15.2.4 Property, Facilities, and Infrastructure Damage

While property damage in the form of vehicle repairs is an obvious outcome of transportation incidents, it is not the only form. Roadways, roadway infrastructure, and nearby infrastructure can also be harmed. These damaged infrastructure items can, in turn, contribute to accidents and cost money to replace damaged safety infrastructure, for both taxpayers and individuals. Cass County indicated it pays $10,000 to $20,000 a year replacing street signs that cost between $100 and $150 plus labor. Newer signs with reflective features designed to be better seen at night may be more costly (Baumgarten, 2019). The state has a problem with shooting vandalism of signs, which can cause signs to be dislodged from poles

Figure 4.15-49: Bridges in North Dakota in Poor Condition



Source: North Dakota Department of Transportation, 2023

and, therefore not communicating important safety messages, such as STOP, to other drivers. Other counties replace as many as 50 percent of their safety signs each year.

Bridges and roadways damaged from weather, overweight vehicles, accidents, or deferred maintenance can contribute to accidents as well. The state has 45 bridge spans considered to be in poor condition as of 2023, as shown in **Figure 4.15-49**. Another 447 non-state spans were in poor condition. This adds up to 762,716 square feet of bridges in poor condition (NDDOT, 2023). Just 51.2 percent of state bridges are in good condition, and 42.0 percent of county or local bridges are considered to be in good condition.

Figure 4.15-50: North Dakota Road Statistics

Statistics

ND Road Mileage - 2020

State Highway System*	7,415
County System	15,624
Other Rural Roads	60,762
City Streets	4,366
Trails	17,936
Total	**106,103**

* NDDOT maintains approximately 8,624 roadway miles of state highway.

Source: NDDOT, 2020

Figure 4.16-50 provides statistics about the state's road mileage. In 2020, 7,415 miles of North Dakota's roads were state highways, representing about 7 percent of total roads. About 87.9 percent of state-maintained pavement was deemed to be in good condition in 2023. Weather conditions can lead to road conditions shifting quickly, and washed-out roads are a major concern.

A July 2019 road washout occurrence at the Standing Rock Reservation, shown in **Figure 4.15-51**, resulted in two deaths and two others severely injured when the culvert under the road washed out creating a significant gap in the road and a 70-foot-deep ravine where the roadway had been. Four drivers drove into the ravine, causing injuries and deaths. A nurse and a delivery driver lost their lives after a failed water rescue attempt. Those injured included a bus driver and a tribal worker (Svihovec, 2019; Olson, 2020). In addition to tribal responders, Burleigh County, Bismarck, Morton County, and state resources were dispatched to the site from North Dakota, and Mobridge, Corson County and Cheyenne River responders were dispatched from South Dakota and Bureau of Indian Affairs responders were dispatched from the federal government. The culvert had been known to be at risk since 2010.

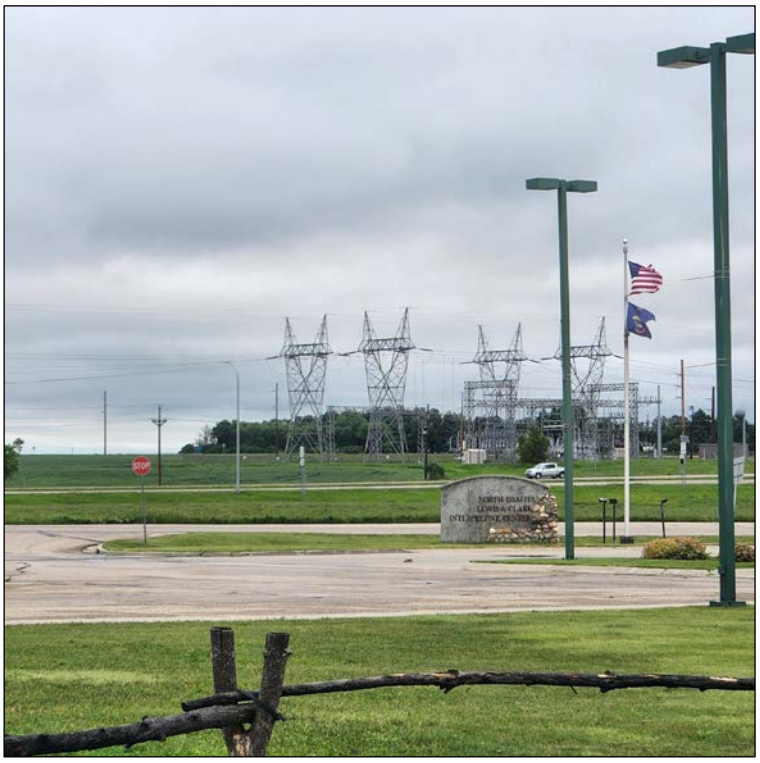
Figure 4.15-51: Road Washout in Standing Rock that Led to Fatalities

Source: Standing Rock Tribal Roads Department, 2019

It is not just tribal roads that are problematic in the state. In April 2022, a travel advisory was issued for rural Barnes County due to the excessive reports of road washouts on rural roads, including no passable roads in Minnie Lake Township (Urness, 2022). Three months later a driver was hospitalized after driving into a washout on ND Highway 32 near Fordville (Harbo, 2022).

Road infrastructure is not the only infrastructure at risk. An April 2022 washout in a rural area near Hatton removed a 100-yard by 30-foot-deep stretch of land and water infrastructure in Steele County. Prior to the washout, there had been a 48-inch culvert to move water, but the culvert was washed out with the land (Grand Forks Herald Staff, 2022).

Figure 4.15-52: Substation near Highway 83 in McLean County



Source: Carrie Beth Lasley/AtkinsRéalis

Electric substations can be at risk of damage from a transportation incident. Many substations including the one in McLean County along Highway 83 shown in **Figure 4.15-52**, are located very near to roads where they could be damaged or a dangerous factor in a transportation incident, and many have limited buffer features between the facility and the highway. While having these facilities near roadways makes them accessible for maintenance, they are also near intersections and busy roads that may create additional cascading impacts from transportation incidents.

A respondent's comment from the state mitigation plan survey: "My experience in the energy industry makes me believe we will face electrical grid reliability issues. I believe this is something our communities would be very unprepared for with our normal extremes in weather we take for granted having reliable electricity to keep us comfortable. The grids are frequently operating at or near capacity the push for renewables has made this way to frequent. The potential for man-made disasters seems to also have increased in recent years across the country. Example: A major train derailment in downtown Bismarck or any other city the railway passes directly through would be absolutely catastrophic."

4.15.2.5 Critical Facilities, Community Lifelines, and State Assets

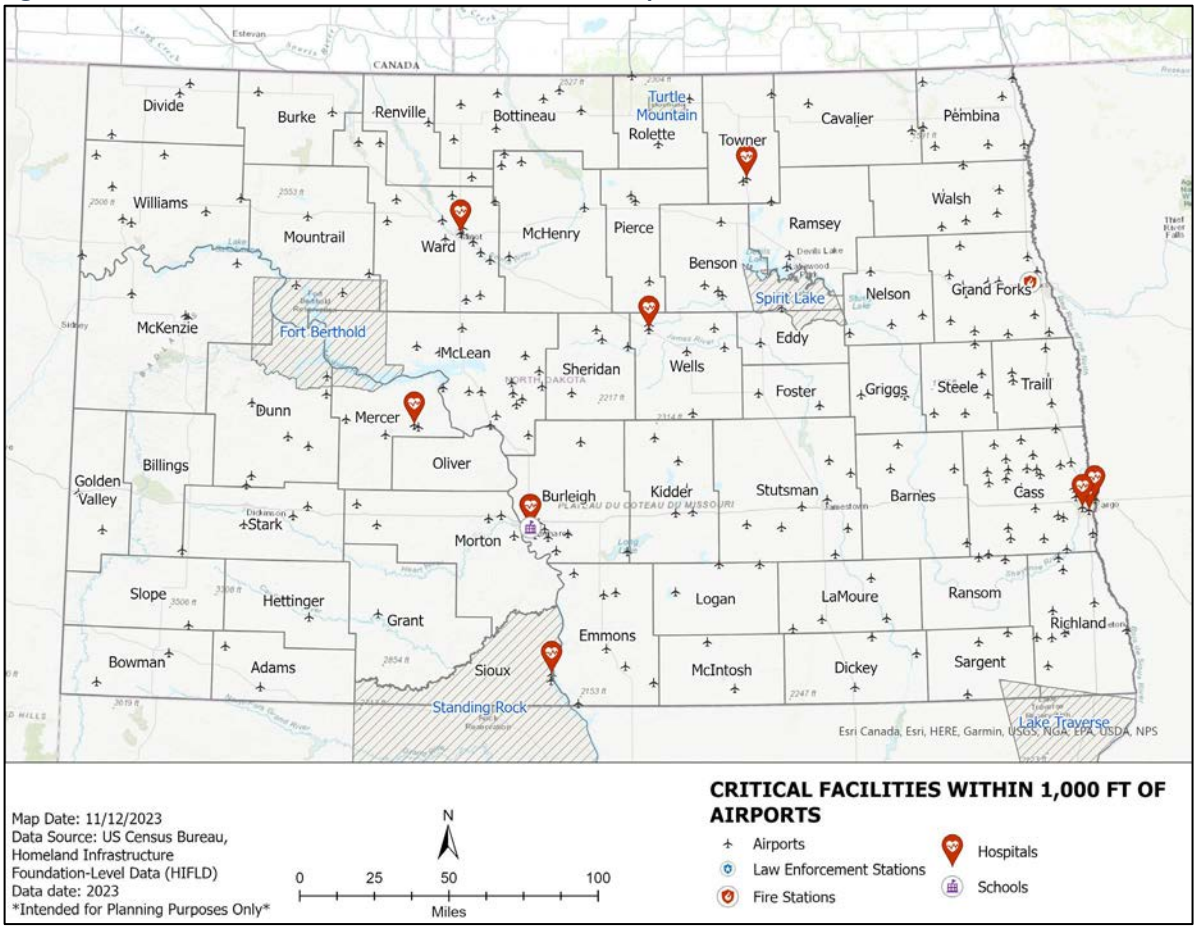
Critical facilities, community lifelines, and state assets outside of transportation assets and facilities are unlikely to be impacted by the consequences of transportation incidents.

Rural areas may be vulnerable to delays in service in hospitals due to a mass-casualty transportation incident due to the lower capacity for a rural hospital to cope with the needs from such an event.

Figure 4.15-53 shows the critical facilities with 1,000 feet of an airport. These are facilities that could be impacted in the event of an aviation incident. Of the 10 critical facilities that are within the 1,000-foot buffer, nine are hospitals, which would likely be needed in the event of a significant aviation incident while also facing possible impacts. The proximity may also be a good feature, allowing those impacted to receive swift medical care.

Please note: The map shows only one hospital in Bismarck, however there are two acute care hospitals CHI St. Alexius Health is within the 1,000-foot radius of the Bismarck Airport, Sanford Medical Center is located two blocks away and could also be impacted by an air transportation incident.

Figure 4.15-53: Critical Facilities within 1,000 feet of an Airport.



Source: Homeland Infrastructure Foundation-Level Data, 2023; ACS, 2023

4.15.2.6 *State Economy and Economic Disruption*

Transportation continues to cause the most occupational fatalities in the state, according to the Bureau of Labor Statistics (2021), resulting in 53 percent of all work-related deaths in the state, while increasing from 2020 to 2021. Agriculture and logistics are the most impacted industries (BLS, 2021).

Figure 4.15-54: Railroad Incidents in North Dakota by Company, 2018-2022

Railroad Company	Incidents
BNSF	49
Red River Valley and Western	11
CPKC	9
Dakota, Missouri Valley, and Western	8
Northern Plains	3
Dakota Northern	2

Source: Federal Railroad Administration, 2023

Nearly every major transportation incident cost the economy in the form of delays and detours. For example, the FRA estimates that each time a train strikes a trespasser the initial investigation and restoration of traffic flow takes an average of four hours. This is four hours of delays that can cause economic knock-on effects to manufacturing industries that rely on just-in-time deliveries, or for time-limited truckers who must return to pick up delayed freight. This is true for road closures and airfield closures after significant accidents or during investigations.

BNSF has the most mileage of North Dakota railroad tracks, but also is responsible for 60 percent of the rail incidents as shown in **Figure 4.15-54**.

Commercial semi-trucks were involved in 510,000 transportation accidents nationally in 2019. Accidents with semi-trucks are more likely than other accidents to result in a fatality for the other driver (Cuniff and Cetera, 2023). In addition to their impact to the companies they are driving for, their weight makes them especially dangerous for other drivers involved in accidents with them. They also sit higher, creating another safety hazard for passenger vehicles.

4.15.2.7 *Delivery of Service and Continuity of Operations*

Transportation incidents frequently result in the need for detours and road closures which may delay service delivery. A transportation incident is unlikely to impact most delivery of state services or continuity of operations. However, the ND Division of Homeland Security Offices, the primary State Emergency Operations Center, Watch Center, State Radio Dispatch Center and ND National Guard facilities at Fraine Barracks are immediately adjacent to the Burlington Northern Santa Fe (BNSF) rail line. A rail transportation incident involving hazardous materials release at this location has the potential to disrupt state emergency response. An evacuation or shelter-in-place order could each expose staff to life threatening chemicals and limit access of other emergency response personnel such as Emergency Medical Services. A derailment even without hazardous materials could block ingress and/or egress from Fraine Barracks limiting the ability of staff to report and the deployment of state resources. Establishment of an alternative emergency operations center and dispatch center would need to occur with staff from other state agencies and/or off duty staff identified in the continuity of operations plan lines of succession and would delay the initiation of a coordinated response.

Such incidents do not increase vulnerability.

4.15.2.8 *Public Confidence in the State's Governance*

On December 30, 2013, a BNSF Railway Company (BNSF) train with 112 cars loaded with grain derailed 13 cars while traveling near Casselton, North Dakota. One of the derailed grain cars landed on the adjacent set of tracks and was struck minutes later by another BNSF train with 104 tank cars loaded with petroleum crude oil (crude oil). After the collision, about 476,000 gallons of crude oil were released and burned.

"The railway system is really important to North Dakota. When you look at our ag products to our energy products specifically, they carry a large load, and it's vital to the economy here," said Darin Hanson, director of Homeland Security at the Department of Emergency Services.

From farmers who produce crops to oil workers in the Bakken, almost everyone has a stake in the rail safety game.

The Railway Safety Act of 2023 is making its way through congress and will make it a requirement to inform states of the types of hazardous materials that are being transported across their borders. Among other requirements, trains carrying large amounts of flammable liquids (like crude oil) to comply with speed restrictions in urban areas, improve braking systems to make trains stop faster, conduct a route risk analysis to ensure railroads take the safest route and take steps to mitigate safety and security risks, and ensure railroads have a hazardous materials (hazmat) spill response plan in the event of a derailment.

While the Railway Safety Act of 2023 is not a North Dakota specific piece of legislation, the benefits of the Act will be felt in every town through which a rail line passes. The feeling that the government actually cares enough to enact such a regulation will spill over to include the state governance as well.

4.15.2.9 *Estimation of Annual Losses*

Nationally, general aviation accidents cost between $1.64 billion and $4.64 billion annually when considering lost productivity along with physical damage (Sobrieralski, 2013). **Figure 4.15-55** shows the data for the human consequences in North Dakota in recent years (NTSB, 2023). The number of incidents and minor injuries have increased slightly since the last plan update; however, the rates are very similar with about 6 incidents a year and just more than 1 fatality.

Figure 4.15-55: Aviation Incident Human Consequences

Year	Incidents	Fatalities	Seriously Injured	Minor Injuries	Uninjured
2018	10	4	3	10	7
2019	5	0	1	1	4
2020	6	2	1	0	6
2021	6	2	2	1	2
2022	7	0	0	5	9
2023	2	0	0	2	2
Annualized 2013-23	5.8	1.3	1.3	2.1	5.2
Annualized 2018-23	6.0	1.3	1.2	3.2	5.0

Source: National Transportation Safety Board, 2023

The Federal Railroad Administration (FRA) has looked at the financial impact of trespass fatalities. As mentioned earlier, each time a train strikes a trespasser the investigation and restoration of traffic takes about four hours. The FRA has created a method for estimating losses by assuming 200 passengers per train and each passenger's time on the train is worth $20.40 per hour. If the involved train is carrying freight, FRA estimated the value of this time as $637.26 per hour. In addition, the conductor or engineer on the involved train has a wage rate of $31.57 per hour (FRA, 2020). FRA used these assumptions to estimate the value of a reduction in train delays if all expected trespass accidents were avoided. Using this estimate, if each trespass fatality occurred from an average North Dakota freight train with two conductors and delayed one passenger train, the cost per year would be $2,818,547.92.

Actual derailments can be much more costly (Isidore, 2023). The cost of the Casselton derailment cleanup in 2013 was $6.1 million (Springer, 2018).

A NHTSA report examined the economic impact of 1996 vehicle accidents, determining that the economic cost of that year's accidents was more than $150 billion in the cost of property damage, emergency department care and rehabilitation alone (NHTSA, 1996). By 2019 that figure had increased to $340 billion. To place it into perspective, that is $1,035 per American in 2019. If you added in lost productivity, another $30 billion could be added to the total (NHTSA, 2023). **Figure 4.15-56** shows the human consequences annualized for motor vehicle accidents in North Dakota. With just under 12,000 accidents a year, North Dakota loses 101 people and injures just under 4,000 North Dakotans a year.

Figure 4.15-56: Annualized Human Consequences for North Dakota Vehicle Accidents, 2018-2022

Crashes	Fatalities	Injuries
11,967.0	101.5	3,965.3

Source: NDDOT, 2023

The National Safety Council NSC) has created a method for estimating loss from motor vehicle crashes, shown in **Figure 4.15-57**. Using the NSC's methods, car accidents cost North Dakota $1,264,475,200 from 2017 to 2021 (NSC, 2023, NDDOT, 2022). That makes for an estimated $419,955,920 loss, each year in the state.

Figure 4.15-57: Loss Estimation Methodology from the National Safety Council

Average Economic Cost by Injury Severity or Crash, 2021	
Death (K)	$1,778,000
Disabling (A)	$155,000
Evident (B)	$40,000
Possible (C)	$24,000
No injury observed (O)	$6,700
Property damage only (cost per vehicle)	$5,700

Source: National Safety Council, 2023

As of 2022, there have been more than 2,600 pipeline leaks in the United States causing more than $4 billion in damages and response costs and cost 122 lives (Vilcovici, 2022). A major gas leak is reported to the federal government every 40 hours.

4.15.2.10 Community Resilience

Some of the most effective actions to improve community resilience to transportation incidents is to reduce human error and adopt preventative behavior. The state is supporting this resilience through its Vision Zero Plan that combines public education, new laws, enforcement, and improved infrastructure into a strategy with the goal of zero traffic fatalities. Among the infrastructure changes are rumble strips, roundabouts, turning lanes and road diets (Vision Zero, 2023). The strategy has seen the passage of distracted-driving laws and the creation of safety enforcement corridors. Public engagement includes memorial walls so people who have lost others in vehicle crashes can share stories.

Figure 4.15-58: Vision Zero Public Messaging

Source: NDDOT, 2023

4.15.2.11 Future Conditions

Through the end of this century in North Dakota, expect more frequent, larger, more intense, and/or longer duration droughts, floods, summer storms, winter storms, and attendant impacts - most of which are expected to adversely impact corresponding transportation corridors and lead to more frequent transportation incidents.

The following list is based on information extracted from the NOAA National Centers for Environmental Information, summary for North Dakota (Frankson, 2022), the Fifth National Climate Assessment (Knapp, 2023), and related resources:

- **Location.** Transportation Incidents are possible throughout the state and will remain so.
- **Extent/Intensity.** Future climate conditions are not expected to impact the extent or intensity of transportation incidents.
- **Frequency.** Transportation incidents are likely to increase in frequency commensurate with expected increases in severity and frequency of adverse weather conditions, such as drought, flood, and storm, and the increased impacts of such weather conditions on transportation infrastructure.
- **Duration.** The duration of transportation incidents is not projected to change.

4.15.2.11.1 Extreme Climate Variability and Climate Change

Through the end of this century North Dakota's natural yet extreme climate variability will continue to be the primary influencer or signal within each natural hazard (Frankson, 2022). This may directly or indirectly impact areas and peoples across the state over days to decades long timescales, while the much more subtle and gradual trends of climate change over the rest of this century act to extend the range of such variability (Knapp, 2023). And such studies show that both trend and variability could extend beyond that which has previously been documented in the historical record.

Recent climate change trends have shown, and future projections suggest that the state can expect continued gradual warming in all seasons, with greatest warming in the winter season. Overall precipitation is likely to increase, but with a high degree of inter-seasonal and interannual variability, which could lead to longer and more severe droughts interspersed with more frequent and more intense flooding (Swain, 2015). Severe summer and winter season storms will continue to occur in both drier, drought-prone periods, and wetter, flood-prone periods within the state's overall extreme climate variability. According to the Federal Highway Administration (FHWA, 2023), extreme weather events, warming temperatures, extreme cold weather, and increased precipitation can contribute significantly to the frequency of transportation hazards. And in North Dakota, future climate projections include all these extreme weather event types.

More Extreme Drought and Flood Cycles. In North Dakota both droughts and floods are likely to increase in frequency and intensity. Recent decades have seen an increase in precipitation across North Dakota, with an overall lower frequency in drought conditions during a recent protracted wet cycle, with conditions from 1993 to 2019 considered to be part of the region's natural variability (Hoerling, 2010; Hoerling, 2013; Hoell, 2023). Just as Flash Floods can occur under conditions of more intense precipitation, Flash Drought can occur under conditions of drier conditions and higher temperatures (Otkin, 2018). Rapidly changing landscape conditions, expected to increase under Future Climate scenarios, will likely lead to a more frequent incidence of destabilization of many geologic features and adversely affect transportation corridors (FHWA, 2023). Under future climate conditions, the rapid cycling of flood to drought and flood to drought should also increase.

Recent statewide examples of rapid change from flood to drought include the 2011 flood/2012 drought/2013 flood sequence; the 2017-18 drought/flash drought into 2019 flood sequence; and the 2021 flash drought with embedded flood and flash flood episodes.

More Extreme Summer and Winter Storms. Likewise, storms occurring in both summer and winter seasons are likely to increase in intensity and possibly in both frequency and duration over any one area. Warmer summertime and wintertime temperatures in conjunction with higher low-level moisture availability, through any combination of moisture transport and local evapotranspiration, produce larger footprint (areal extent) storms, along with larger areas of heavy precipitation (NCEI/StormData, 2023). Such storms do not necessarily produce a larger number of distinct severe weather events per storm; however, the larger footprint area of the storm equates to a larger areal coverage of any corresponding severe summer or winter event-type

While collaborating with Oil and Gas safety workers, we learned they had great concern and stories to share about transportation incidents and the cascading impacts that these can have on people and business operations. From hazards ranging from dust storms with visibility similar to a blizzard due to droughts, potholes from variable temperatures and standing moisture, or the challenges that come with travel in the wintertime, these natural hazards can increase the probability and the magnitude of the crash for all citizens.

I-94 passes through Valley City bringing in consistent and stubborn drivers who are stalled or stuck in severe winter weather conditions, often after recommendations for no travel or road closures, causing wear on first responders who are then asked to save citizens. Residents and County employees recalled the strain that these actions hold on community resources. Communities throughout the state experience these occurrences often during extreme winter weather events.

(hail, damaging wind, tornado, heavy snow, ice, etc.) impact area with a corresponding increase in duration at any one location.

4.15.2.11.1.1 Impact

Increased episodes of both flood and drought can induce geologic hazards and contribute to increased road/rail washouts, shifting soils, and the increase in other damages to surface transportation corridors. The expected increase in frequency of these factors is discussed further in the Geologic Hazards profile. The Federal Highway Administration (FHWA 2023, Table 2-2, p.12) also provides an extensive list of Future Climate impacted geohazards along with specific references.

Increased episodes of severe summer and severe winter weather are more likely to occur per unit area, under future climate conditions, with a corresponding increase in transportation incidents related to such weather hazards. The projected increase in temperature and precipitation during the late fall, winter, and early spring seasons is expected to support a higher incidence of mixed precipitation (sleet), freezing rain, or ice storms (Easterling, 2017). Increased occurrences of mixed precipitation and/or ice, of any depth, are expected and will likely impact specific walkways, roadways, rail lines and runways at a higher frequency.

Increased Thunder-Snow and Ice Storms. Thunder-snow, ice storms, and freezing drizzle events occur most often across the Central Plains, Ohio Valley, and Eastern Great Lakes states. This pattern has been steadily shifting poleward (north) from the later quarter of the last century through 2014, and future climate projections indicate a steadily increasing potential for such storms in the Northern Great Plains region (Groisman, 2016). Intuitively this makes sense as this mimics the historical pattern and accounts for projected increases in low-level moisture, convective instability, melting height, and wind shear which should create shifts in hail size and occurrence, and all critical to wintertime thunderstorm development (Raupach, 2021). However, the ability of Global Climate Models (GCMs) to replicate the thermodynamic processes typically used in convective weather models remains questionable.

4.15.2.11.1.2 Adaptation

Adaptation actions might include the regular repair and maintenance of roadbeds, railbeds, and bridges, along with regular maintenance of nearby ditches. Potential adaptation options and assessment strategies are identified in FHWA-HIF-23-008 (FHWA, 2023. Additional actions may be like those discussed as mitigation actions, below).

4.15.2.11.1.3 Mitigation

With a potential for increased size, intensity, frequency, and/or duration of heavy precipitation (with flooding), higher temperatures (w/drought and wildfire), and severe summer and winter storm events (including heavy snow and ice) per specific area - and given the potential for an increased frequency of related transportation impacts - there should be an increased emphasis on longer-term mitigation strategies (FHWA, 2023; NDDOT, 2023). Specifically, such strategies could include the incorporation of transportation corridor designs which:

- Reduce exposure to wind, including living snow fence,
- Reduce erosion of road/rail beds and/or improve resiliency to extremes of weather, including the projected increase in freezing precipitation events, and

- Minimize cascading effects, including those caused by rapid or abrupt changes from drought to flood and flood to drought.

Additional mitigation strategies are discussed within the Geologic, Flood, and Drought Hazard profile sections, and the Severe Summer and Severe Winter Weather Hazard profile sections.

4.15.2.11.2 Other Changes

Increasing population in areas where roadway improvements may not have caught up to higher traffic volumes or where railroad crossings may not be properly signaled are two real risks that contribute to increased risk of transportation incidents in cities and western North Dakota. While many of the infrastructure improvements in the state have occurred in the Bakken, there are both commercial and passenger vehicle increases, and many workers travel many miles for work. The Western North Dakota Counties of Dunn, McKenzie, Mountrail, and Williams have grown at a rate of 72.3 percent since 2010 (U.S. Census Bureau, 2020), and growth is expected to continue at a rate of 54.9 percent. This has already led to new development in areas like Williston, Minot and Dickinson and the rural areas between them. Accommodating the booming oil and gas workforce and their young families will increase development and critical infrastructure in these areas, placing more people and property at risk of harm from transportation incidents, as well as more people on the road to participate in them.

The urban areas of the state are anticipated to have a 24.6 percent growth rate between 2020 and 2040 (U.S. Census Bureau, 2020). Areas in and near Fargo, Grand Forks, Bismarck, and Williston will see more infill development and development on their fringe. The traffic increase that will accompany this population growth will quickly outgrow the road networks leading to more congestion and more accidents. The safety of airplanes, railroads, motor vehicles, and pipelines improve over time. Political mandates and the cost of accidents make safety a feature worth investing in for most vehicles.

4.15.3 Risk Analysis

Risk can be defined as the potential for loss of or damage to an asset (FEMA EMI, 2023). This section analyzes the potential for loss or damage in the state of North Dakota.

4.15.3.1 National Risk Index

The National Risk Index does not evaluate this hazard.

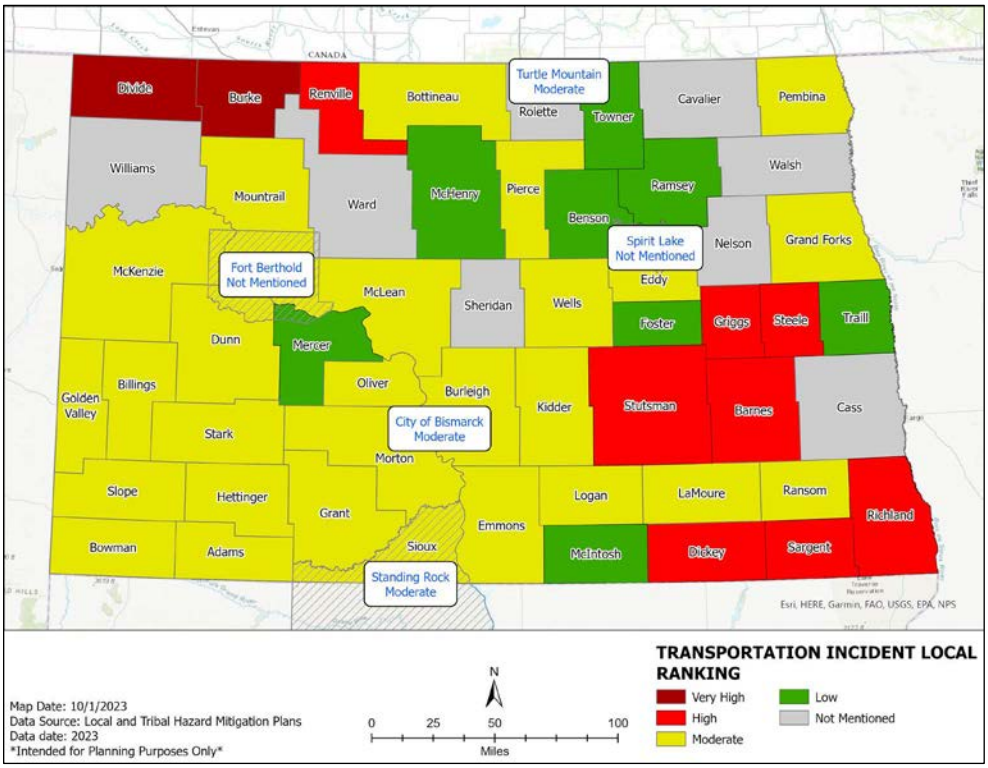
4.15.3.2 Risk Index Score

The Priority Risk Index for this plan update ranks transportation incidents as low risk with a score of 1.3. Transportation incidents are ranked 15th of 15 hazards within the state.

4.15.3.3 Jurisdictions At Risk

Figure 4.15-59 shows how the state's local hazard mitigation plans evaluated transportation incidents. When evaluating local and tribal mitigation plans 48 of 58 of the adopted plans identify transportation

Figure 4.15-59: Local and Tribal Mitigation Plans and Transportation Incidents



Source: Local and Tribal HMPs, 2023

incidents as a hazard impacting their jurisdiction. However, of all plans that ranked hazards, 30 considered it a moderate risk.

4.15.4 Summary/Conclusion

The following bullets demonstrate highlights and conclusions related to transportation incidents.

- The Vision Zero safety strategy from the North Dakota Department of Transportation focuses on reducing traffic fatalities that incorporates physical, legislative, and public messaging solutions across a broad range of transportation safety issues. The goal of the program is zero fatalities, and it represents an example of a community resilience strategy focused on this hazard.
- North Dakota had two large train incidents - a passenger train accident that killed some returning servicemen in 1945, and an explosive derailment in Casselton in 2013 that caused the evacuation of 1,400. Both crashes facilitated the development of safety mandates that would reduce the likelihood of such events in the future.
- Since motor vehicles are the primary vehicle of response, an aviation, railroad, or pipeline incident in remote areas or in dangerous terrain can pose a challenge for responders, necessitating state or federal resources and delayed response.

- Transportation incidents are often a cascading failure from winter or summer severe weather as icy roads, high winds, clouds, precipitation, and fog can all contribute to mass-casualty transportation incidents.
- Rural areas with limited responders can find their first responders quickly over-capacitated and in need of mutual aid partners. If conditions are such that mutual aid partners are responding to their own emergencies, delays in response may occur or state resources may be needed to assist in response efforts.

  Road improvements in the Bakken have reduced semi-truck accidents, but a growing population means that road needs may continue. Ward and Mountrail counties have the most railroad incidents.
- About 101 North Dakotans die in motor vehicle accidents each year, and lack of seat belt use is a factor in more than half of fatalities. Fatal car accidents are more likely to occur in urban areas and railroad crossing in urban are a major contributor to trespassing casualties at railroads.
- There are more motor vehicles on North Dakota roads than there were in the last plan update.
- Pipeline incidents are generally decreasing but more miles of pipeline are coming online, and gathering and transmission pipelines are still problematic.
- Grade crossings for railroads and highways are still the standard for nearly all North Dakota crossings and just 1 in 5 have gated arms. Improving safety features can reduce fatalities, especially in areas that are growing.
- NDDOT is using traffic cams to help determine road conditions and spot accidents on major thoroughfares.
- Aviation incidents cost a little more than one life a year in North Dakota, and rail incidents cost less than one life a year, but more than $1 million in damages.
- North Dakota has several counties where large numbers or large proportions of residents do not have health insurance. One of these residents involved in a traffic incident could find themselves unable to get the care needed to restore their quality of life due to an inability to access care.
- Distracted driving is against the law and a contributing factor in accidents.
- First responders can be particularly vulnerable in transportation incidents because their occupational responsibilities place them on the side of roads, stopped in medians, responding to accidents, and driving through traffic signals.
- Wildlife and livestock can pose a risk for motor vehicle and rail accidents. NDDOT has installed two wildlife underpasses that allow animals safe passage under highways, but animals of any type can cross highways at any place they choose. Dusk, dawn, and overnight hours are particularly hazardous for wildlife-vehicle collisions.
- Transportation incidents can lead to the loss of historic bridges or degrading of scenic byways through physical and environmental damage.
- Washouts have been particularly deadly and damaging in North Dakota, causing damage to infrastructure, and leading to fatal car accidents.

4.15.5 Data Limitations

Much of the data that may have made this analysis more robust is privately held by corporate bodies and insurance agencies.

5 Capability Assessment

5.1 Overview

North Dakota has been working toward a culture of resiliency to limit the impacts of future disasters. Planning initiatives have evolved to the point where 80 different federal, state, local and tribal agencies, non-profit organizations, associations and businesses participated in the 2024 Enhanced Mitigation Mission Area Operations Plan (MAOP) update, contributing data, technical support, resources and direction for the state's mitigation strategy. The State Hazard Mitigation Team's (SHMT's) diverse hazard-specific committees that participated in this planning process were representative of the integration that occurs across all North Dakota programs. Integration with surrounding states, while not explicit during this planning process, also occurs in North Dakota. Hazards such as fire and floods require cross-state coordination to address different mitigation and response needs.

SHMT members also collaborate with their Canadian counterparts on mitigation initiatives, such as the International Souris River Study Board created by the International Joint Commission. The binational study board reviewed operations of the Rafferty, Grant Devine, Boundary and Lake Darling Reservoirs, and proposed alternative approaches and recommendations to Canadian and United States governments on potential measures to reduce the risks of flooding and maximize water supply and water use benefits.

As illustrated by the breadth of the SHMT, mitigation requires the support of federal, state, local, tribal and private sector partners to enact a results-oriented mitigation strategy designed to increase North Dakota's resiliency to natural and technological hazards and adversarial threats. These partners have a strong history of collaborating to leverage technical, financial and material resources in pursuit of mitigation actions that have proven effective for the State. Understanding the current and potential role that agencies and organizations play in mitigation is key to developing an effective mitigation strategy. This section discusses North Dakota's statewide commitment to risk reduction, resilience and mitigation through a number of existing "coordinating structures." This includes organizations, agencies, groups, committees and teams that carry out activities in support of building resiliency and further identifies additional opportunities statewide for integration based on these existing programs and partnerships.

North Dakota Department of Emergency Services (NDDES) has worked extensively to improve its involvement with the local and tribal planning initiatives across the state. NDDES has been invited to, and participated in, a multitude of public meetings held during the development or update of local and tribal mitigation plans. NDDES participation in these planning efforts has helped local and tribal communities feel supported by the state in their mitigation planning efforts, while also improving the final planning product. This is evident in the review and approval of these local Hazard Mitigation Plans (HMPs) by the NDDES planners, who have been granted the authority to approve all local and tribal mitigation plans developed by Hazard Mitigation Assistance (HMA) subrecipients through the Program Administration by States (PAS) Pilot Program. NDDES also provides courtesy reviews of tribal mitigation plans. The state has been successfully managing its mitigation program since the last plan update. Additionally, the mitigation staff is partnering with local and tribal mitigation planning teams, community organizations,

and underserved populations to pursue the NDDES' Community Coffee initiative. These Community Coffees are intended to increase public outreach efforts for mitigation planning. There, participants share their experiences with hazards and threats as well as ideas to mitigate their impacts.

5.2 Methodology

North Dakota has a robust set of capabilities to support mitigation efforts statewide. The overarching methodology was to assess the state's capabilities and integration of other planning and emergency functions to embed them into the overall mitigation strategy. This included reviewing the emergency services program and identifying and analyzing the current tools for the reduction of loss of life and property. An evaluation of the state legislation, policies, regulations and programs was conducted. An in-depth study of statewide integration, review of funding availability and programs and the effectiveness of the local mitigation endeavors was utilized to ascertain the strengths of the state mitigation program.

5.3 Capability Assessment Findings

The capability assessment elements of evaluation are outlined below with the evaluation of planning and regulatory, administrative, fiscal and political abilities and resources.

5.3.1 State Capabilities Analysis and Statewide Integration

Within the state government, several agencies and programs are central to mitigation. NDDES is the lead state agency for all federal HMA programs. However, members of the SHMT lead and take part in many statewide mitigation programs and projects as coordinating structures to advance the principles of risk reduction, resilience and mitigation outside of the Enhanced Mitigation MAOP planning cycle. Given the importance of multi-agency involvement, interagency teams are often utilized to establish priorities and assist communities. For more information about the planning teams, see Section 1. Planning Process.

5.3.1.1 Planning and Regulatory Capacity and Integration

Overall, the State continues to make great strides in hazard mitigation. The State has diversified its funding resources to ensure mitigation projects are achievable annually, relying less on Hazard Mitigation Grant Program (HMGP) funding. Additionally, encouraging local and tribal mitigation programs, like the National Flood Insurance Program (NFIP), Community Rating System (CRS) and StormReady, promotes a culture of mitigation throughout the state. Since the 2018 plan update, North Dakota has continued to use the Program Administration by State (PAS) Pilot Program for all delegated authorities therein, which has provided the state with more responsibilities and oversight for HMGP grant management (see Section 6. Mitigation Strategy for more information about North Dakota's PAS status). Additionally, the integration of the Threat and Hazard Identification and Risk Assessment (THIRA) process into the hazard mitigation planning process in the last plan update enhances the

capability of the SHMT to better understand hazards, threats and the capabilities required to mitigate impacts.

Figure 5.1 shows the laws enacted in the state of North Dakota that are relevant to hazard mitigation as well as their relevant hazard. North Dakota has passed a statewide floodplain ordinance and has passed initiatives around cybersecurity and law enforcement that help keep its residents safe. This assessment includes an evaluation of whether the laws improve or impede resilience to future natural hazard events.

Figure 5.1: Statutes in North Dakota relevant to Hazard Mitigation

Citation	Initiative	Relevant Hazard(s)	Analysis
NDCC 2-05	Aeronautics Commission	Transportation Incident, Terrorist Attacks	This law enables the State Aeronautics Commission to act as an agent for any municipal airport or facility for the purpose of planning, construction and the administration of federal or other funds. It allows the state to allocate funds for planning and construction activities at airports in the state and established the Aeronautics Commission Special Fund and Airport Infrastructure Fund for projects related to airport improvement or projects eligible for federal funding. The law can lead to mitigation actions that can lead to hardening municipal airports and facilities.
NDCC 4.1-37, NDCC 4.1-38	Anhydrous Ammonia Facilities	Hazardous Material Release	Establishes siting and control regulations and enforcement mechanisms for anhydrous ammonia, mitigating the impacts of releases.
NDCC 11-09.1	Home Rule	All Hazards	Empowers counties to levy taxes, including infrastructure fees, implement planning and zoning in unincorporated areas and engage in grant administration for those areas. By implementing planning and zoning in unincorporated areas, this law decreases the need for additional mitigation actions.
NDCC 11-33	County Zoning	All Hazards	Allows for the regulation or restriction of property in the county for health, safety, morals, public convenience, general prosperity or public welfare and establishes the processes and enforcement authorities for this

Citation	Initiative	Relevant Hazard(s)	Analysis
			action. By implementing restrictions of property, this law decreases the need for additional mitigation actions.
NDCC 12.1-06.2	Criminal Street Gangs	Criminal Attacks	Defines a criminal street gang and establishes gang activity as a Class C felony, increasing the penalty and serving as a potential deterrent.
NDCC 12.1-25	Riot	Civil Disturbance	Defines a riot, criminalizes riot activity and establishes the guidelines for a class A, class B, and Class C riot offense. Establishes disobedience of a public safety order during a riot as a class A misdemeanor, increasing the penalty and serving as a potential deterrent.
NDCC 12-1-41	Uniform Act on the Prevention of and Remedies for Human Trafficking	Criminal Attacks	Defines and criminalizes human trafficking, determines the rights of victims, mandates public outreach through the Department of Transportation and determines the processes and rules of evidence for trial. Enables restitution, increasing the penalty and serving as a potential deterrent.
NDCC 15.1-21	Curriculum and Testing	Cyberattacks	Requires computer science and cybersecurity education, decreasing the possibility of the public falling victim to cyberattacks.
NDCC 15.1-26-08	Adult Education	Cyberattacks	Requires computer science and cybersecurity education, decreasing the possibility of the public falling victim to cyberattacks.
NDCC 18-01-04	Fires	Fire	Enables the fire marshal to establish fire prevention regulations and conduct public education, decreasing the need for additional mitigation actions.
NDCC 18-01-35, NDCC 18-01-36	Fires	Fire	Authorizes the state insurance commissioner to collect fees for the Fire and Tornado Fund and Petroleum Release Fund, expanding insurance coverage for jurisdictions across the state.

Citation	Initiative	Relevant Hazard(s)	Analysis
NDCC 23-07	Reportable Diseases	Infectious Disease	Allows for the department of health and human services to designate mandatory reportable diseases or health conditions and outlines the relevant process and penalties. Establishes quarantine authority and allows local boards of health to establish temporary hospitals. Allows for school boards to require vaccination for admission for certain diseases with certain exceptions. Prohibits face mask requirements. Early reporting and other authorities mitigate the extent of disease spread.
NDCC 23-12-20	COVID-19 vaccination and infection information	Infectious Disease	Prohibits the state, its agents, and businesses from requiring documentation of COVID-19 status or vaccination as a condition of public access or employment. This law limits capabilities to mitigate the extent of disease spread.
NDCC 23-13-04	Doors of Public Buildings -- Construction	Fire	Mandates doors meet requirements of state building code for safe ingress and egress. Implementation of building codes and standards increases resilience and helps prevent impacts from future disasters.
NDCC 23-13-06	Owner of land to fill abandoned or disused wells, shafts, and other excavations	Geologic Hazards	Requires the fill of abandoned mine lands, decreasing the likelihood of geologic hazards.
NDCC 23-13-15	Smoke detection systems for residential rental property	Fire	Requires smoke detectors in rental residential properties. Implementation of building codes and standards increases resilience and helps prevent impacts from future disasters.
NDCC 23.1-04	Hazardous Waste Management	Hazardous Material Release	Establishes state regulations and administration, decreasing the likelihood of hazardous materials releases.

Citation	Initiative	Relevant Hazard(s)	Analysis
NDCC 23.1-10	Environmental Emergency Costs	Hazardous Material Release	Establishes an environmental quality restoration program with an annual appropriation from funds from administrative action, donations, oil and gas fund transfers, federal funding and other sources to restore the environment from environmental damage, increasing recovery capabilities.
NDCC 23.1-12	Petroleum Release Remediation	Hazardous Material Release	Establishes a petroleum tank release compensation fund, reporting requirements and appropriation powers for the regulation of petroleum releases, increasing recovery capabilities.
NDCC 32-12.2	Claims Against the State		Establishes a risk management fund and creates guidelines for disbursement rules, providing insurance against litigation.
NDCC 36-14	Contagious and Infectious Diseases Generally	Animal Disease	Establishes quarantine, trade, and health certification requirements for livestock in the state. Early reporting and other authorities mitigate the extent of disease spread.
NDCC 37-17.1	Emergency Services	All Hazards	Establishes the roles and responsibilities for the Department of Emergency Services, creates the hazardous chemicals preparedness and response fund, requires localities to establish emergency services, establishes hazard mitigation authorities, enables mutual aid, creates and allocates funding for the disaster or emergency recovery fund to be used for match funding for federal disaster assistance, creates the hazard mitigation revolving loan fund to help communities with federal matching funds for mitigation. This law allows the state to have an enhanced mitigation program.
NDCC 38-14.2, NDCC 38-14.3	Abandoned Surface Mine Reclamation	Geologic Hazards	Establishes the state abandoned mine reclamation fund to be used for reclamation of dangerous abandoned mine lands and establishes the

Citation	Initiative	Relevant Hazard(s)	Analysis
			processes and authority for reclamation allocations, increasing recovery capabilities following an incident.
NDCC 39-10	Rules of the Road	Transportation Incident, Severe Winter Weather	Includes 39-10-21.1 which gives the Highway Patrol the ability to close roads for hazardous conditions and enforce closures among other rules designed to reduce transportation incidents, mitigating the effects of multiple hazards.
NDCC 51-30	Notice of Security Breach for Personal Information	Cyberattacks	Established mandatory cyberattack reporting to the state, helping to mitigate the effects and extent of a cyberattack.
NDCC 54-16	Emergency Commission	All Hazards	Authorizes the disbursement of federal and state funds critical in the response, recovery, and mitigation from a disaster, expediting state, tribal and local response, recovery and mitigation.
NDCC 61-01-09	Destruction of Dams	Dam Failure	Makes tampering with a dam a class A misdemeanor, serving as a potential deterrent.
NDCC 61-02	Water Commission	Flood, Drought, Dam Failure	Places responsibility of flood control and water resource development with the state water commission, requires water development planning for major river basins, outlines cost-share for state resources, mandates the construction and operation of the outlet for Devils Lake, provides bonding authority for water development, establishes the Emergency drinking water grant program, and financial assistance for flood control projects, restricts development in dam inundation zones. This increases the scope of the state's mitigation program.
NDCC 61-02.1	Flood Control Reduction Projects	Flood	Provides state assistance for flood mitigation projects, increasing the scope of the state's mitigation program.

Citation	Initiative	Relevant Hazard(s)	Analysis
NDCC 61-03-25	State Engineer	Dam Failure	Mandates Emergency Action Plans for high-or medium-hazard dams to mitigate the impacts of potential dam failures.
NDCC 61-15-10	Water Conservation	Dam Failure, Drought	Permits Red River of the North communities to dam the river to protect water supplies, reducing the possible impacts of drought.
NDCC 61-16	Creation of Water Resource Districts	Floods, Dam Failure	Established dam safety procedures and permits tax levy authority for flood control projects to mitigate the impacts of potential flooding.
NDCC 61-16.2	Floodplain Management	Flood	Restricts development in regulatory floodways and floodplains, establishes administration for participation in the National Flood Insurance Program. Implementation of building codes and standards increases resilience and helps prevent impacts from future disasters.
NDCC 61-24.3	Southwest Pipeline Project	Drought	Requires the state to develop a water pipeline to transfer water resources from the Missouri River to southwestern areas of the state, reducing the possible impacts of drought.
NDCC 61-24.6	Northwest Area Water Supply Project	Drought	Requires the state to develop a water supply project to alleviate drinking water needs in the northwest area of the state reducing the possible impacts of drought.
NDCC 61-24.7	Red River Valley Water Supply Project	Drought	Promotes drought mitigation by providing a cost-share for the development of water supply projects in the Red River
NDCC 61-34	Drought Disaster Livestock Water Assistance Program	Drought	Promotes drought mitigation by establishing a program to provide water-supply relief resources for livestock producers impacted by drought.
NDCC 61-41	Water Policy and Projects	Flood, Drought	Promotes mitigation by establishing an infrastructure loan fund for resources to develop or preserve water supplies, recover infrastructure from flood

Citation	Initiative	Relevant Hazard(s)	Analysis
			damages and construct flood control projects.
NDCC 89-08	Dams, Dikes and Other Devices	Dam Failure	Regulates dams, inspections, and maintenance. Implementation of building codes and standards increases resilience and helps prevent impacts from future disasters.

5.3.1.2 Programs, Partnerships, and State Plans

There are several different organizations, agencies and committees in North Dakota that carry out activities on a regular basis to build the state's resiliency toward natural disasters. This section of the plan demonstrates the different programs, partnerships and state plans into which the goals and objectives of mitigation have been integrated. These efforts span a variety of different sectors, including emergency management, economic development, land use development, housing, health and social services, infrastructure, and natural and cultural resources. Each description below identifies the major partners and describes information about meetings and coordination where appropriate. During each plan update, the programs are evaluated by the appropriate agency regarding their strengths, weaknesses, changes and potential improvements.

In addition to these programs, partnerships and plans, members of the SHMT support a number of other hazard mitigation-related initiatives. These include reducing the risk of flooding in river basins through planning, participating in dam safety exercises, building resilient infrastructure, limiting the spread of several human and animal infectious diseases, promoting better understanding of hazards and threats and advancing understanding of hazard impacts through the use of technology. As demonstrated in the planning process, this plan's stakeholders engage in a myriad of projects, meetings and organizations that integrate hazard mitigation planning data and actions into their mission and processes.

5.3.1.3 Emergency Management

5.3.1.3.1 North Dakota Silver Jackets Program

Administered by: North Dakota Department of Water Resources (NDDWR)

The North Dakota Silver Jackets Program is primarily focused on the communication and collaboration of agencies for the coordination, enhancement and streamlining of flood-related solutions. The concept was organized in North Dakota as a response to the 2009 floods. Charter members of the Silver Jacket Flood Risk Management Team in North Dakota include NDDES, NDDWR, North Dakota Geological Survey, FEMA Region VIII, National Weather Service (NWS), U.S. Department of Agriculture (USDA) Natural Resources Conservation Service (NRCS), U.S. Fish and Wildlife Services (USFWS), U.S. Geological Survey (USGS), and U.S. Army Corps of Engineers' (USACE) St. Paul and Omaha Districts. The charter goals of the team focus on improving flood mitigation at all levels of government. The North Dakota

Silver Jackets Program is managed by NDDWR. The Flood Management Team meets annually, with additional meetings as necessary on individual projects. Several SHMT members support the work of Silver Jackets.

The North Dakota Silver Jackets Program provides a mechanism for improvements to the flood mitigation system. It also fosters collaboration and communication across agencies. The program also provides an avenue for local and tribal agencies to receive guidance and information regarding flood-related problems. However, this program does not have a definitive source of funding. The North Dakota Silver Jackets Program is approximately 10 years old and it continues to be integrated into mitigation programs in North Dakota.

Changes since the 2018 Plan update:

- Submitted Risk Assessment Map Enhancement Project to Department of Water Resources for final review and approval.
- Continued collaborating with USGS and Omaha Corps of Engineers toward the completion of the ongoing Missouri River Basin Non-Stationarity Study.
- Submitted Discharge-Frequency Curve Updates on the Mouse River at the Sherwood and Westhope Gages Project for final review.
- Completed installation of five (of six) NDDWR PRESENS gages in the ongoing Souris River Basin Soil temperature and Moisture Gage Project.
- Completed Hydrology phase of Medora Flood Risk Reduction Study with Hydraulic Modelling Underway.
- Secured approval for Flood History Project in October 2022 – currently underway.
- Secured approval for Phase 1 and Phase 2 of Statewide Flood Frequency Analysis Project.
- Submitted all four Mouse River Basin Flood Inundation Mapping Project phases, models and mapping to NWS and National Oceanic and Atmospheric Administration for final approval and implementation on the Souris River Basin NWS Advanced Hydrologic Prediction Service websites.
- Completed Red River Datum Conversion Project for Red River Basin with the assistance of USGS.

Items included in previous 2018 Plan updates:

- Completed non-structural Flood Risk Reduction Workshops in Linton and Beulah in support of Corps Section 22 Flood Risk Reduction Studies.
- Completed Flood Specific Emergency Action Plan Workshops in Linton and Beulah in support of Corps Section 22 Flood Risk Reduction Studies.
- Completed Flood Specific Emergency Action Plan Workshops in Jamestown and Lamoure.
- Continued final stages of Corps Section 22 Flood Risk Reduction Studies for Emmons County Water Resource District.
- Continued final stages of Corps Section 22 Flood Risk Reduction Studies for Mercer County Water Resource District.
- Completed Light Detection and Ranging (LiDAR) acquisition for entire state of North Dakota (at Quality Level III).
- Initiated New LiDAR acquisition for the Red River Basin (at Quality Level II).

- Supported the Souris River Joint Board with request and support for the Mouse River Basin Corp Feasibility Study.
- Completed Statewide Probable Maximum Precipitation Study in May 2021.
- Completed Mouse River Rural Structure Inventory Study.
- Completed Mouse River Unsteady Flow Hydrologic Engineering Center River Analysis System (HEC-RAS) Model for United States and Canada stretches of Mouse River.

Implementation challenges:

- Funding may be considered a challenge; overall, implementation is going well.

Suggested improvements to the program:

- Encourage additional agencies to join, such as North Dakota National Guard.
- Increase North Dakota Silver Jackets Program awareness.

5.3.1.3.2 StormReady Program (SRP)

Administered by: NWS

The StormReady Program (SRP) is a community preparedness program that helps local communities develop plans for dealing with severe weather. The SRP provides guidelines for local emergency managers when handling severe weather operations. To become an SRP community, several guidelines must be met. These include the following:

- Establish a 24-hour warning point and emergency operations center.
- Have more than one way to receive severe weather warnings and forecasts in order to alert the public.
- Create a system that monitors local weather conditions.
- Promote the importance of public readiness through community seminars and other outreach methods.
- Develop a formal hazardous weather plan to include training severe weather spotters and conducting emergency exercises.

Becoming nationally recognized as an SRP community can help communities increase their scores on the CRS, which in turn can lower NFIP insurance rates, broadly assist communities with maintaining local plans and increase public awareness and preparedness.

There are 93 total SRP sites in North Dakota. This includes 48 counties, 40 communities, 1 Tribal Nation and 4 Universities. These sites are identified in the table below.

Figure 5.2: StormReady Sites in North Dakota

Name	Type	Name	Type
Adams	County	**Williams**	County
Barnes	County	**Amidon**	Community
Billings	County	**Ashley**	Community
Bottineau	County	**Beach**	Community

Name	Type	Name	Type
Bowman	County	**Bismarck**	Community
Burke	County	**Bottineau**	Community
Burleigh	County	**Bowbells**	Community
Cass	County	**Bowman**	Community
Cavalier	County	**Carrington**	Community
Dickey	County	**Center**	Community
Divide	County	**Crosby**	Community
Dunn	County	**Dickinson**	Community
Eddy	County	**Ellendale**	Community
Emmons	County	**Fargo**	Community
Foster	County	**Fessenden**	Community
Golden Valley	County	**Harvey**	Community
Grand Forks	County	**Hettinger**	Community
Grant	County	**Jamestown**	Community
Griggs	County	**LaMoure**	Community
Hettinger	County	**Linton**	Community
LaMoure	County	**Mandan**	Community
Logan	County	**Manning**	Community
McIntosh	County	**McClusky**	Community
McHenry	County	**Medora**	Community
McKenzie	County	**Minot**	Community
McLean	County	**Mohall**	Community
Mercer	County	**Mott**	Community
Morton	County	**Napoleon**	Community
Mountrail	County	**New Rockford**	Community
Nelson	County	**Rolla**	Community
Oliver	County	**Rugby**	Community
Pembina	County	**Sheyenne**	Community
Pierce	County	**Stanley**	Community
Ramsey	County	**Stanton**	Community
Renville	County	**Towner**	Community
Rolette	County	**Wahpeton**	Community
Sargent	County	**Washburn**	Community
Sheridan	County	**Watford City**	Community
Sioux	County	**West Fargo**	Community
Slope	County	**Williston**	Community
Stark	County	**Standing Rock Sioux Tribe, Fort Yates**	Indian Nation
Steele	County	**North Dakota State University**	University
Stutsman	County	**United Tribes Technical College**	University
Traill	County	**University of Mary**	University
Walsh	County	**University of North Dakota**	University
Ward	County		
Wells	County		

Source: NWS, 2023

Changes since the 2018 Plan update:

- As of November 2023, 29 new SRP sites have been added since 2018.

- In Fiscal Year (FY) 2023, North Dakota and Texas each had the newest jurisdictions of any State, tying with 14.

Implementation challenges:

- While the NWS does not charge for jurisdictions to become SRP, communities may need to upgrade emergency preparedness infrastructure to qualify, which could be a financial challenge for jurisdictions with outdated equipment.

Suggested improvements to the program:

- Work with NWS North Dakota SRP contacts to identify and support new communities to become SRP.
- Integrate SRP into other mitigation programs and practices.

5.3.1.3.3 Cloud Modification Program (CMP)

Administered by: NDDWR

The North Dakota CMP is an operational program that seeds clouds for hail reduction and rain enhancement. The program operates from June 1 through August 31 each year. It operates in the western North Dakota counties of Bowman, McKenzie, Mountrail, Williams and part of Slope (NDDWR, 2023). Studies have shown a 45 percent reduction in hail crop losses as a result of this program. The program also has excellent benefits to cost ratios of 16-26:1 for agricultural production and 48-72:1 for gross economic impact. Practitioners believe that the program provides dividends to the state. However, the impacts of the program are limited, as only seven counties in the state participate.

Changes since the 2018 Plan update:

- A study to update the economics of the program was completed in 2019.
- As of 2023, the program has provided 407 pilots with training and experience.

Implementation challenges:

- Funding poses a challenge between available funds and program structure.

Suggested improvements to the program:

- None

5.3.1.3.4 Emergency Management Performance Grants (EMPG)

Administered by: NDDES

The purpose of EMPG is to provide Federal funds to states to assist state, local, territorial and tribal governments in preparing for all hazards. The EMPG Program supports the goal to Strengthen National Preparedness and Resilience. The National Preparedness System is the instrument the Nation employs to build, sustain and deliver the core capabilities needed across all mission areas (i.e., Prevention, Protection, Mitigation, Response and Recovery) to achieve the goal of a more secure and resilient Nation.

North Dakota continues to apply for, and be awarded, EMPG funding on an annual basis. Most recently, in FY 2023, the State was allocated $3.2 million in EMPG funding. The State's annual EMPG award has averaged around $3 million since 2014.

Changes since the 2018 Plan update:

- Implementation of Grants Management Software system in 2017 to manage grants electronically with the local Emergency Managers.
- Works with all sections of Emergency Management: Hazard Mitigation, Recovery, Operations and Planning, and Training and Exercise.
- Requirement that at least one project in the FY 2023 EMPG Program Work Plan and budget narrative specifically addresses equity considerations.

Implementation challenges:

- Notice of Funding Opportunity is often received with short notice, requiring NDDES to complete the application in an abbreviated timeframe.
- It is difficult to implement the changes from FEMA when those changes are published a year after the period of performance begins.
- Turnover of local/tribal Emergency Managers.

Suggested improvements to the program:

- Continue to train and assist the local Emergency Managers.
- Continue to work with all sections of Emergency Management at both the state and local level.

5.3.1.3.5 Emergency Management Accreditation Program (EMAP)

Administered by: NDDES/EMAP

EMAP aims to establish credible standards for emergency management and disaster preparedness programs across the United States. EMAP is an independent, non-profit organization that establishes these standards and evaluates programs against the standards for accreditation. There are five steps taken to be an EMAP accredited emergency management program: subscription, self-assessment and application, on-site assessment, committee review and commission decision, and accreditation and maintenance (EMAP, 2018). The Emergency Management Standard is the standard to which the emergency management programs are evaluated, which consists of 66 individual standards including topics such as: hazard identification, risk assessment and consequence analysis, and hazard mitigation (EMAP, 2018). North Dakota became EMAP accredited in 2018. EMAP requires the support of 26 state agencies, many of whom are SHMT partners.

Changes since the 2018 Plan update:

- Found preliminarily compliant with all 73 elements of EMAP standards during an on-site assessment.
- Received Consecutive Accreditation in 2023.

Implementation challenges:

- Interpretation of Standards can be subjective.
- Preparation required extensive groundwork to develop or revise plans to ensure compliance.
- Twenty-six agencies supported the process by developing Continuity of Operations Plans (COOP) when they were balancing other priorities.

Suggested improvements to the program:

- Continue to integrate EMAP requirements into other standard program activities.
- Develop a systematic approach to ensuring periodic updates of proofs of compliance.

5.3.1.3.5.1 Integration with Emergency Management Planning

The SHMT has made integration a core tenet of the 2023 Plan Update. Recognizing the importance of mitigation as a backbone for a variety of different emergency management plans and activities, as well as some of the redundancies that occur from the variety of different meetings, the SHMT integrated the THIRA with the 2018 Enhanced Mitigation MAOP Update, which has since been maintained. Evidence of this integration within the plan can be seen in Section 4. Additionally, in order to streamline the EMAP reaccreditation process for the state, the plan update has been aligned with the mitigation related EMAP standards. This integration is woven through the various sections of the plan.

In addition, the composition of the SHMT Committees (Appendix B) was organized to allow seamless integration both into the Enhanced Mitigation MAOP Update, and from the Enhanced Mitigation MAOP back to the respective agencies. The following agencies related to emergency management were included in the SHMT: American Red Cross, Bismarck Fire Department, LaMoure County Emergency Management, North Dakota Bureau of Criminal Investigation, North Dakota State Fire Marshal, North Dakota Firefighters Association, NDNG, NWS, NDDES, North Dakota Emergency Management Association (NDEMA), North Dakota Fire Chiefs Association, North Dakota Safety Council, State and Local Intelligence Center, NDDWR, USACE, Department of Homeland Security (DHS), North Dakota Emergency Management Association, City of Bismarck Emergency Management, Stutsman County Emergency Management, Nelson County Emergency Management, Pembina County Emergency Management, City of West Fargo Emergency Management, Burleigh County Emergency Management, Nelson County Emergency Management, Williams County Emergency Management, Logan County and Dunn County.

The Enhanced Mitigation MAOP is actively integrated into other relevant plans, such as dam safety plans, agency strategic plans, COOP, emergency operations plans, local HMPs, homeland security plans and local THIRAs.

5.3.1.4 Economic Development

5.3.1.4.1 Main Street North Dakota

Administered by: North Dakota Department of Commerce (NDDOC)

SHMT and NDDOC have taken steps to integrate mitigation into Main Street North Dakota, a gubernatorial initiative designed to strengthen North Dakota communities. The Main Street North Dakota program is intended to help North Dakota cities create vibrant cores to attract and retain talent, enhance workforce skills and build smart and efficient infrastructure.

Changes since the 2018 Plan update:

- 2021 Main Street North Dakota Summit was held in West Fargo with both in-person and virtual attendees.
- A Main Street North Dakota Summit was planned for October 2023 but was postponed due to a winter storm.
- The NDDES Disaster Recovery Chief serves on the Main Street Initiative Board, and the Recovery Chief, or a designee, attends all Main Street Initiative community meetings.

Implementation challenges:

- None

Suggested improvements to the program:

- Encourage program presentations include the importance of hazard mitigation as it relates to building stronger and more resilient communities.

5.3.1.4.1.1 Integration with Economic Development Planning

The SHMT Committees were organized to allow seamless integration into the Enhanced Mitigation MAOP Update and from the Enhanced Mitigation MAOP back to the respective agencies. The following agencies related to economic development were included in the SHMT: North Dakota Insurance Department, North Dakota Stockmen's Association, North Dakota Association of Rural Electric Cooperatives, North Dakota Public Service Commission, NDDOC and USDA.

The Enhanced Mitigation MAOP is actively integrated into other relevant plans, such as economic development plans, workforce safety plans and the state building code. As an example, the Economic Recovery Branch Annex of the Recovery MAOP assigns 48 public and private partners to assess commercial sector impacts, protect consumers through systematic and expedited contractor licensing and registration and implement business recovery programs and initiatives to increase economic sustainability and viability. This branch promotes initiatives to help individuals recover from financial losses and supports implementation of recovery and restoration strategies for the following sectors: commerce, commercial facilities and financial services.

5.3.1.5 Land Use Development

5.3.1.5.1 Community Assistance Program (CAP)

Administered by: NDDWR

The NDDWR conducts outreach and provides technical assistance to local and tribal governments through the FEMA CAP-State Support Services Element (SSSE) funding opportunity; one full-time employee provides this service. The policy of the state through the CAP-SSSE Program is to provide state coordination and assistance to communities in floodplain management activities, encourage communities to adopt, administer and enforce sound floodplain management ordinances, provide the state engineer with the authority necessary to carry out and enforce a floodplain management program, and coordinate federal, state and local floodplain management activities in the state. State elements of this program include community assistance visits, community assistance contacts, workshops/training,

technical assistance, enrollment, CRS Support, mapping assistance and disaster assistance. The NDDWR maintains a five-year plan for CAP activities.

Changes since the 2018 Plan update:

- Renamed the NDDWR in 2021.
- Moved functions of the Office of the State Engineer within the NDDWR.
- Currently six divisions make up the NDDWR: Administration, Atmospheric Resources, Planning and Education, Regulatory, Water Appropriation and Water Development.

Implementation challenges:

- Limited resources prohibit a more robust program.
- The state has less experienced staff in the flood management section.
- NDDWR staff has developed familiarity with communities enrolled in NFIP. However, sustaining a floodplain management understanding in all NFIP participating communities is challenging.
- Community floodplain administrator turnover causes lack of continuity.

Suggested improvements to the program:

- Continue to strengthen the partnership with FEMA to identify and map communities at risk and promote NFIP participation and implementation.
- Increase resources to provide more training opportunities to all communities.

5.3.1.5.2 National Fire Plan/Firewise North Dakota/State Fire Assistance (SFA) Program

Administered by: North Dakota Forest Service (NDFS)

The Firewise North Dakota and SFA programs promote wildfire awareness, prevention and mitigation, particularly in fire prone areas. Activities typically involve equipment purchases, fire suppression assistance, outreach, hazardous fuels reductions, planning, and defensible space projects. NDFS manages these programs.

These programs provide funding priorities that emphasize mitigation, particularly fuels reductions, in wildland urban interfaces. A wide variety of mitigation activities are eligible through this program. Nationally competitive grants provide consistency across the nation. However, the focus can easily shift to preparedness activities rather than mitigation. Funding can vary greatly from year to year. The relatively low number of timbered acres versus dry grassland acres in North Dakota can reduce the number of projects that fit within the usual timber-focused programs.

Changes since the 2018 Plan update:

- Hazardous fuels reduction activities have expanded in Slope County as a result of the 2004 Deep Creek fire and additional funding has been made available annually to implement practices.
- Five private landowners have implemented hazardous fuels reduction activities within ponderosa pine forests.
- To complement activities on private land, the NDFS has entered into a Good Neighbor Authority Agreement with the United States Forest Service (USFS) – Dakota Prairie Grasslands to

implement hazardous fuels activities on public land adjacent to private land. Five priority areas have been identified within the agreement.

Implementation challenges:

- Availability of funding to implement hazardous fuels reduction and mitigation activities.
- Coordinating an effective, timely, comprehensive statewide prevention and awareness program remains a challenge.
- Developing a landscape scale model to create fire-adapted ecosystems by implementing hazardous fuels reduction activities including mechanical thinning and prescribed fire.
- Engaging the 17 counties that have developed Community Wildfire Protections Plans and encouraging them to implement mitigation activities.

Suggested improvements to the program:

- Develop a guide of best practices and successes.
- Facilitate a working session that brings together public information officers from multiple organizations to help develop fire messages and create outlets for the information.

5.3.1.5.2.1 Integration with Land Use Development Planning

While NDDES and SHMT make land use development recommendations, it is ultimately the responsibility of the local jurisdictions to execute land use related mitigation measures and fully integrate mitigation with land use development (Section 4.2.1). The following agencies related to land use development were included in the SHMT: NDDOC, USDA, USFS and USGS.

The Enhanced Mitigation MAOP is actively integrated into other relevant plans, such as comprehensive and land use plans and economic resiliency plans. North Dakota Department of Community Services (NDDCS), a division within NDDOC, is charged with providing technical assistance related to community planning to local governments and state agencies and can be leveraged to facilitate this integration. SHMT works with NDDCS to encourage the cross integration of local and tribal mitigation, land use and economic planning teams to ensure all efforts account for the hazards and threats facing communities, as well as develop strategies to continue making communities more resilient.

5.3.1.6 Housing

5.3.1.6.1 Building Code Program

Administered by: NDDCS

North Dakota maintains a voluntary building code program that provides technical assistance to communities in adopting and enforcing building codes. NDDCS has the responsibility of updating the North Dakota State Building Code, which currently consists of the 2021 International Building Code, International Residential Code, International Mechanical Code, International Fuel Gas Code and International Energy Conservation Code with some state amendments. Communities can join the program by adopting and enforcing the state building code. As of 2023, there are 12 counties and 121 cities that have adopted the state building codes, as summarized in **Figure 5.3 and Figure 5.4**.

The program does require local adoption and enforcement of the codes, which can be a financial burden on some communities. Therefore, a significant limitation of this program is that communities may adopt the state building code but not enforce it, allowing for inconsistent regulation of new development and remodels across the state. The Manufactured Home Installation Program within NDDCS requires all newly installed manufactured/mobile homes in the state to be inspected to certify proper installation. The NDDCS coordinates with NDDES to provide technical assistance to local mitigation planning teams regarding the code enforcing status of cities and counties; steps to take to ensure enforcement or to adopt building codes; and suggested verbiage for mitigation actions related to building code enforcement.

Figure 5.3: Code Enforcing Counties in North Dakota as of 2023

Code Enforcing Counties			
Adams	Dunn	Morton	Williams
Billings	Grand Forks	Mountrail	Ward
Burleigh	McKenzie	Stark	Hettinger

Figure 5.4: Code Enforcing Cities in North Dakota as of 2023

Code Enforcing Cities			
Alexander	Gackle/Logan	Larimore	Reynolds
Amenia	Garrison	Leonard	Richardton
Argusville	Gladstone	Lincoln	Rogers
Barney	Glen Ullin	Lisbon	Ross
Beach	Glenburn	Mandan	Sentinel Butte
Belfield	Glenfield	Manvel	Sherwood
Beulah	Golden Valley	Mapleton	Souris
Bismarck	Goodrich	Mayville	South Heart
Brinsmade	Grafton	McClusky	St Thomas
Buchanan	Grand Forks	McVille	Stanley
Bucyrus	Granville	Medina	Stanton
Burlington	Gwinner	Medora	Surrey
Carrington	Halliday	Milnor	Taylor
Carson	Hankinson	Minnewaukan	Thompson
Casselton	Hannaford	Minot	Tioga
Cavalier	Harwood	Mohall	Tolley
Center	Hatton	Mooreton	Underwood
Christine	Hazelton	New Rockford	Upham
Coleharbor	Hazen	New Salem	Valley City
DesLacs	Hettinger	New Town	Wahpeton
Devils Lake	Horace	North River	Walhalla
Dickinson	Hunter	Northwood	Washburn
Drake	Jamestown	Oakes	Watford City
Dunn Center	Kathryn	Page	West Fargo
Elgin	Kenmare	Pekin	White Earth
Ellendale	Killdeer	Portal	Williston
Enderlin	Kindred	Prairie Rose	Wilton
Fargo	Kulm	Ray	Wyndemere
Fordville	Langdon	Reiles Acres	Zap

Code Enforcing Cities			
Forman	Abercrombie	Cando	Colfax
Oxbow			

Changes since the 2018 Plan update:

- North Dakota Planning Association presented “Building Codes in Rural North Dakota” at the October 2022 Mitigation Plan Developers Meeting.
- NDDES stressed the importance of building codes during a 2023 G318 Hazard Mitigation Workshop in Fargo.
- NDDOC presented “State of ND Building Code as We Know Them” at the October 2022 Mitigation Plan Developers Meeting.
- Fire Marshal’s Office presented “Understanding Fire Codes and the Value in Reviewing Them” at the October 2022 Mitigation Plan Developers Meeting.
- Department of Water Resources presented “Importance of NFIP Standards and the Intersection of Building Codes” at the October 2022 Mitigation Plan Developers Meeting.

Implementation challenges:

- The state has no inspection authority, which falls to the local governments.
- Enforcement can be costly for local jurisdictions.
- By population, 90 percent live in a jurisdiction that has adopted building codes, but enforcement is spotty since many jurisdictions lack resources to conduct inspection and enforce the code.
- Few counties adopt the building codes; as a result, rural residents do not have enforcement or inspection of codes.
- Home mortgage banks and insurance companies are increasingly asking whether an applicant lives in an area where building codes are enforced.

Suggested improvements to the program:

- Develop comprehensive outreach materials for statewide dissemination.
- Promote mitigation plans as a resource for guiding facility placement, issuing building permits and implementing or updating zoning ordinances.
- Expand the webpage for the Mitigation Planning Toolbox to include information on the State’s building code program.

5.3.1.6.1.1 Integration with Housing Planning

The Enhanced Mitigation MAOP is actively integrated into other relevant plans, such as affordable housing plans and vulnerable population services. This integration supports the mission of the Housing Branch Annex of the Recovery MAOP for the 40 public and private partner agencies, to assess communities' needs and housing inventories, implement short-term housing programs and identify long-term sustainable solutions to enhance community resiliency.

5.3.1.7 Health and Social Services

5.3.1.7.1 Hazardous Materials Emergency Preparedness (HMEP) Program

Administered by: NDDES

The HMEP program through the Pipeline and Hazardous Materials Safety Administration (PHMSA) provides grants for planning and training. Within the planning program, risk assessments and hazard studies are eligible. NDDES provides technical assistance and administers this grant program for the state.

This program promotes hazardous material risk assessments and studies, but the focus is on preparedness rather than mitigation.

Changes since the 2018 Plan update:

- With HMEP dollars NDDES is conducted a Flow Study across the state. Individual counties now have access to data about what hazardous materials are traveling through or being stored in their counties; are able to identify geographic areas (roads, train routes, pipelines) which are at risk of experiencing an accident/spill; and can identify populations, public and private facilities which may be impacted by accidents/spills. The counties can utilize this information to mitigate impacts by identifying mitigation actions to prevent spills from occurring in those areas (ex., reduced speeds). The Flow Study was completed in 2019.
- HMEP funding establishes opportunities for responders to obtain training for addressing hazardous materials accidents and spills, including awareness level to technician level. During the FY 2016-2017 grant over 600 volunteer and professional firefighters received training through the HMEP program.
- As of January 2023, North Dakota has more than $150,000 available in HMEP Grant funds awarded by the United States Department of Transportation's (DOT) PHMSA.

Implementation Challenges:

- The primary challenge in implementing HMEP programs is that the majority of responders are part of departments which are manned by "volunteer" departments. These firefighters already have full-time jobs so finding personal time to participate in training can be difficult, forcing participants to take vacation time from their jobs or participate in weekend training taking them away from families.
- Developing plans and organizing exercise events are a challenge simply due to time. Most county emergency managers are in part-time positions, and this limits the activities which they can organize.
- The growth of the oil industry in western North Dakota has impacted volunteer departments because of an increase in callouts. Where a department may have previously had two or three calls during the month, they now face responding to accidents on a much more frequent basis. This is putting a strain on the volunteer system and upon those businesses who have staff participating with volunteer departments. While there has been a bit of a respite with the decline of activity in the oil patch, work is beginning to ramp up again and response activity is increasing. With this type of schedule volunteers have no time for training and exercising.

Suggested improvements to the program:

- None

5.3.1.7.2 North Dakota State University (NDSU) Extension

Administered by: NDSU

NDSU Extension provides research-based information to the residents of North Dakota on various topics, including disaster preparedness and recovery. State specialists and county Extension agents provide educational publications, media releases and videos on many topics, including cleaning and repairing flooded household goods and homes, drought issues, family life and children and farm and ranch operations. The Extension provides resource materials in multiple languages.

NDSU Extension state specialists and county Extension agents provide research-based information and education to help North Dakotans prepare for and recover from various disasters, including winter storms, droughts and flooding. The Extension provides information, videos, news releases, lesson plans and more. NDSU Extension is active in the national Extension Disaster Education Network that offers courses educators can teach locally. NDSU Extension staff also collaborate with NDDES, other SHMT partners and state agencies staffing the State Emergency Operations Center to develop flood and drought response and mitigation strategies.

Changes since the 2018 Plan update:

- Expanded the variety of in-person and online workshops, courses and other educational events.
- Several NDSU Extension Agents and specialists have been honored for their efforts, including Christina Masich, Rick Schmidt, Anitha Chirumamilla, Gregory Endres, Renae Gress, Travis Hoffman, Angie Johnson, Mohamed Khan and Jeff Stachler.

Implementation challenges:

- No Extension staff time is dedicated to disaster education.
- Staff have other priorities until their community is in a disaster.
- New staff must be hired and trained in disaster education work for succession planning.

Suggested improvements to the program:

- Dedicate a portion of a new staff member or a graduate assistant's time to disaster education.

5.3.1.7.2.1 Integration with Health and Social Services Planning

The North Dakota Department of Health and Human Services (NDHHS) leads efforts to ensure the Enhanced Mitigation MAOP is actively integrated into other relevant plans, such as disease prevention plans, public health and medical all hazards plan, pandemic influenza response plan and environmental health plans. NDHHS works with the 41 agencies assigned responsibility in the Health and Social Services Branch Annex of the Recovery MAOP. The mission is to assess the needs of survivors; restore public health, behavioral health and social services networks; and promote the resilience, independence, health and well-being of the whole community.

5.3.1.8 Transportation

5.3.1.8.1 Transportation Improvements

Administered by: NDDOT

NDDOT regularly conducts mitigation through road improvements. NDDOT prepares risk assessments and designs facilities in anticipation of high-water flows and other potential hazards. Minimum design standards are used to determine structure sizes for different road classifications. NDDOT also encourages local officials to adopt design standards. Structures are evaluated for various flood frequencies in relation to overtopping. This information is then used to assess the risks associated with the various structure sizes. NDDOT also works through transportation improvements to reduce traffic accidents and mitigate losses and casualties due to hazardous material releases and other transportation incidents.

Hazard mitigation is being considered at the strategic level and individual project level. The bridge inspection program identifies bridge issues before they are a problem. However, hazard mitigation is not the primary focus, so it may at times be overlooked.

Changes since the 2018 Plan update:

- Program priorities have shifted to focus on transportation infrastructure in areas experiencing rapid energy development.
- Received approval from the Federal Highway Administration (FHWA) and Federal Transit Administration for the 2023-2026 Statewide Transportation Improvement Program in December 2022.
- Commended by USDOT in December 2022 for actively working with numerous stakeholders on multi-modal opportunities to address access issues in a Medora Transportation Plan using public participation methods.
- President Biden signed the Investment Infrastructure and Jobs Act in November 2021, replacing the Fixing America's Surface Transportation Act which previously funded the program.

Implementation challenges:

- The State's largest cities receive a larger share of federal funding and need to find matching funds. Other cities are not large enough and do not get sufficient federal funds to prompt a match requirement.

Suggested improvements to the program:

- None

5.3.1.8.2 Living Snow Fence Program

Administered by: NDFS

Following the 1996-1997 winter season, the Living Snow Fence Program was initiated in North Dakota to plant living snow fences to prevent the blowing and drifting of snow along roadways. The program was initially funded through the HMGP. The program is now funded 80 percent with federal Transportation Enhancement funds and 20 percent with NDDOT funds. Since 1997, 594 living snow projects have been

completed, protecting 270 miles of roads. The Living Snow Fence Program is managed by NRCS, NDFS and NDDOT.

The Living Snow Fence Program provides a specific emphasis on living snow fence projects related to the winter storm hazard. There are no local match requirements due to match requirement being met with state NDDOT funds. There are high participation rates. Also, the program is a great example of interagency participation to achieve a specific mitigation goal. However, funding for this program is dependent on grants. Snow fences could be vulnerable during periods of drought. Lastly, more "snow drifting" problems exist across the state than funding can mitigate.

Changes since the 2018 Plan update:

- Worked with NDSU Extension to develop a cookbook using fruits common in living snow fences to encourage interaction and promote their adoption.

Implementation challenges:

- Lack of available funding through a variety of programs. An incentives package comparable to what was made available from 1998-2008 is no longer available.
- Interest in living snow fences dwindled after multiple years of milder winters.
- The Living Snow Fence Task Force disbanded around 2008.
- Although there are many sites that could use protection, interested landowner saturation was reached.

Suggested improvements to the program:

- Pursue funding through HMA; encourage state agencies to consider reinstatement of funding for this initiative.
- Following a catastrophic winter, when interest is again piqued, the creation of another task force should be explored.
- An incentives program that duplicates past efforts and includes a land rental payment, cost-share for trees and fabric weed barrier, and a maintenance allotment should be created.

5.3.1.8.3 National Dam Safety Program

Administered by: NDDWR

The purpose of North Dakota's Dam Safety Program is to minimize the risk to life and property associated with the potential failure of dams in the state. Functions of the Dam Safety Program include conducting dam inspections, making recommendations to dam owners regarding necessary maintenance and repairs and maintaining an inventory of dams in North Dakota. There are currently 49 high-hazard potential dams and 62 significant hazard potential dams in the state, 16.1 percent of which are federally owned dams. Dam Safety Program staff conduct full inspections of the 106 non-federally owned high hazard and medium hazard dams on a rotational basis. High hazard dams are currently scheduled for inspection at least once every four years. Medium hazard dams are currently scheduled for inspection at frequencies varying up to once every ten years.

The Dam Safety Program is managed by the NDDWR. The program is primarily state funded; however, FEMA provides some federal funding through National Dam Safety Program grants. Federal funding is

currently being used to develop new minimum standards for dam design and construction permitting. Federal funding has also been used to review dam hazard classifications, conduct hydrologic analyses of high hazard dams, fund one part-time position, provide training opportunities for dam safety employees, purchase equipment necessary for inspections, provide educational workshops and seminars for dam owners and the local dam engineering community, and help dam owners to develop Emergency Action Plans (EAP), to digitize historic dam records, and other projects. Two full time employees staff the North Dakota Dam Safety Program. Permitting the construction of dams is handled through NDDWR's Regulatory Section and is not included in this discussion of the Dam Safety Program.

The Dam Safety Program allows for regular inspection of selected dams. The program provides for a comprehensive dam identification and inventory process. Funding is available to dam owners to assist with the development of EAPs.

Changes since the 2018 Plan update:

- The North Dakota Dam Design Handbook is being revised.
- No state-regulated High Hazard Potential Dams needed to be remediated in 2021 because of hydraulic and/or structural issues.

Implementation challenges:

- There is a lack of resources to ensure that problems identified by inspections are corrected.
- A part-time, federally funded position to assist with the program was eliminated.

Suggested improvements to the program:

- None

5.3.1.8.3.1 Integration with Infrastructure Planning

The Enhanced Mitigation MAOP will continue to be actively integrated into other relevant plans, such as aviation safety plans, regional infrastructure plans, state transportation infrastructure plans, TransAction III: North Dakota's Statewide Strategic Transportation Plan, traffic safety plans, the Statewide Transportation Improvement Program, electric standards, electric inspection plans and building codes. The following agencies related to infrastructure planning were included in the SHMT: FHWA, North Dakota Rural Electric Cooperatives (NDARECs), NDDOT, North Dakota Highway Patrol, North Dakota Petroleum Council, North Dakota State Electrical Board, NDDWR and USACE.

This planning integration also aligns the efforts of 45 public and private partners identified in the Critical Infrastructure Branch Annex of the Recovery MAOP to ensure resilient communities. The mission supports local and tribal governments to assess damages, prioritize repairs, and restore and harden critical infrastructure sectors to include road infrastructure, information technology, dams, power infrastructure, airport infrastructure, energy sector, railroads, pipeline systems, telecommunications infrastructure and communications.

5.3.1.9 Utilities

Since the last plan update in 2018, North Dakota has evaluated the risk and vulnerability to its electrical power infrastructure from the emergency management perspective. This effort includes the preparation

of the Electrical System Resiliency Annex (the Annex) to the State's Enhanced Mitigation Mission Area Operations Plan (the Plan) for NDDES, in collaboration with its partners in the electrical sector. The Annex details the primary risks and mitigation options to address these risks to North Dakota's electrical power infrastructure from select identified hazards and threats. These hazards and threats range from the more prevalent natural hazards in the State (i.e., flood, severe winter weather, severe summer weather) to geomagnetic disturbances associated with space weather (caused by heightened activity like coronal mass ejections from the sun), and include the threat associated with man-made electromagnetic pulses generated by nuclear weapons that have exploded in the atmosphere. This Annex reinforces North Dakota's commitment to understanding the potential hazards that pose significant risk to its electrical grid and positions the State to further examine its vulnerability and identify actions to reduce that susceptibility through mitigation funding, to become more resilient.

The Annex development process built on previous partnerships between NDDES, NDAREC, and NDDOC and has established improved connections resulting in increased statewide capabilities. Participation by key representatives of these organizations, in addition to the continued presence and contributions of Western Area Power Administration and North Dakota Transmission Authority personnel, was instrumental in providing feedback and developing mitigation actions.

The Annex describes the risk and vulnerability of the electrical grid to each identified hazard through an assessment of historical hazard data, review of recent severe events, risk mapping, and network analysis. An analysis of the State's mitigation capabilities was performed using a multi-dimensional approach that included training and workforce development, preparedness, response, and mitigation. The Annex describes opportunities for expanding the State's mitigation capabilities in each of these areas and includes both traditional programs typically funded by FEMA and other federal agencies, as well as more local opportunities identified by stakeholders involved in the development of the Annex. The formulated mitigation actions discussed in this Annex can be implemented over several years to better protect the system and achieve operational continuity of government and critical facilities if an event does occur.

This Annex will be included as an appendix in the Plan which will be adopted as part of the updated Plan.

5.3.1.10 Natural and Cultural Resources

5.3.1.10.1 Cultural Heritage Grant Program

Administered by: The State Historical Society of North Dakota (SHSND)

SHSND has managed the Cultural Heritage Grant Program since it was created in 2003 and provides grant funding for local museums and historical societies. Since 2011, the North Dakota Legislature has authorized funding to organizations and property with disaster planning and preparedness projects or that have been affected by a recent natural disaster. The Cultural Heritage Grant Program provides additional cost-share funding sources to assist historical properties affected by natural disasters.

Changes since the 2018 Plan update:

- Obligating up to $400,000 to the program for the 2023-2025 biennium.

- Recent recipients include the Sargent County Historical Society and the Dickinson Museum Center, both in 2022.

Implementation challenges:

- There is a dollar-for-dollar match requirement for applicants and the funding source is not very large.
- Many applicants are part-time or non-professionals who have limited experience writing grants and sometimes have difficulty translating ideas into definable projects.

Suggested improvements to the program:

- Pursue restoration of funds, if feasible.

5.3.1.10.1.1 Integration with Natural and Cultural Resources Planning

The following agencies related to natural and cultural resources were included in the SHMT: Standing Rock Bureau of Indian Affairs, SHSND, NDDWR, United States Animal and Plant Inspection Service, Bureau of Reclamation (BOR), USDA, USFS, USGS, University of North Dakota Energy and Environmental Center (UND EERC) for Oil and Gas, and Western Dakota Energy Association (WDEA). These agencies help ensure mitigation projects comply with federal, state, local and tribal laws and regulations including the National Environmental Policy Act and the National Historic Preservation Act of 1966.

The Enhanced Mitigation MAOP is actively integrated into other relevant plans, such as the state water management plan, drought disaster livestock water supply plan, historic preservation plans, state park management plans, utility and mining oversight plans, animal health plans, geologic research plans, oil and gas drilling and production plans and forestry and fire management plans. Mitigation factors prominently in the Natural and Cultural Resources Branch Annex of the Recovery MAOP. The mission of the 25 agencies tasked in the plan is to assess damage and identify restoration programs and initiatives to preserve, conserve, rehabilitate and restore natural and cultural resources.

5.3.1.11 Additional State Resources

North Dakota takes a comprehensive view of hazards, creating a broad range of state resources available to mitigate hazards identified in the plan. The North Dakota Century Code (NDCC) identifies eligible funds and funding eligibility that could be used to address mitigation. For example, the Century Code identifies that state assistance can be identified for airports (NDCC 2 § 05-06.5). Similarly, road improvement projects can be funded via tax levies as identified and limited by 24 § 05-01, and these projects could include the expansion of the roadway for safety or improvement of bridges to pass floodwaters. An Opioid Settlement Fund (NDCC 50 § 36-02) has been created with funds to be directed toward mitigation of drug crimes as identified in Criminal Attacks. Funds established by NDCC 55 § 08 allows for funding to be spent to address state park objectives, which could include mitigation activities. In response to the 1997 floods, NDCC 61 § 02.1-01 provides bonding power to the state to invest in flood control projects, which has been used and is discussed in section 4.4.1. Other funds or programs may develop that allow mitigation activities to be enacted using state funds.

5.3.2 Integration with FEMA Programs and Initiatives

The section below outlines how North Dakota has integrated FEMA mitigation initiatives and programs into existing state agencies, organizations, and partnerships to advance the state's mission to reduce risk and build resilience. North Dakota manages a variety of these FEMA programs to fund mitigation projects throughout the state and actively integrates mitigation efforts into a variety of local initiatives. For example, as a participant in the PAS Pilot Program, North Dakota has several delegated authorities related to managing the HMGP applications in the state. The SHMT also included a diverse group of stakeholders, across multiple agencies, which help to administer the FEMA grant programs. These stakeholders in turn bring to the planning process their vast network of working relationships with other local, tribal, state and federal agencies that promote integration of mitigation plans and FEMA's programs.

Another example of integration into FEMA programs is North Dakota's integration of the state THIRA with the 2018 Enhanced Mitigation MAOP update. This integration included utilization of the Enhanced Mitigation MAOP methodologies for the first two steps of the 2018 THIRA update process. It also included merging the THIRA capability target language and the mitigation strategy objectives. The goals and objectives from the Enhanced Mitigation MAOP are considered in all the other FEMA programs that North Dakota manages, including setting priorities for FEMA HMA grants.

5.3.2.1.1 Hazard Mitigation Assistance (HMA)

Administered by: NDDES

FEMA's HMA grant programs provide funding for eligible mitigation actions that reduce disaster losses and protect life and property from future disaster damages. Currently, NDDES administers HMGP, Building Resilient Infrastructure and Communities (BRIC) and Flood Mitigation Assistance (FMA) grant programs in North Dakota, which fall under the umbrella of HMA.

As part of managing and administering the different HMA programs, NDDES works to ensure they are not duplicating efforts of other agencies or organizations, while still providing technical support and assistance in the planning and implementation of activities that help bolster the state's capabilities and promote mitigation. In these efforts, NDDES works closely with NDDWR by holding quarterly meetings to ensure each agency is aware of the other's planned or in process activities, and that each agency participates in these activities when applicable.

Additionally, NDDES has created the State Hazard Mitigation Ranking Team (SHMRT) which consists of representatives from the NDDOT, NDDWR, NDHHS, North Dakota State Historic Preservation Office and NDEMA. SHMRT is used to review and rank each of the projects that are being submitted for funding under the nationally competitive HMA programs to prioritize each of the projects being submitted for competitive grant funding and potential FEMA approval. In addition to SHMRT consisting of representatives from different state agencies, these are also the main regulatory agencies for the state which helps provide an additional level of review and agency involvement when determining which projects should be submitted and funded through these HMA programs.

5.3.2.1.2 Hazard Mitigation Grant Program (HMGP)

Administered by: NDDES

HMGP Section 404 provides federal funding for projects that will significantly reduce or permanently eliminate future risk to lives and property from severe natural hazards. HMGP provides up to 75 percent of funds necessary for a hazard mitigation project through FEMA. Mitigation funds available following a Presidentially declared disaster are based on a percentage of the overall Public Assistance, Individual Assistance and Federal Mission Assignment funds spent. Mitigation funds can be used anywhere in the state and on any natural hazard. SHMT scores and rates hazard mitigation project applications for funding. The HMGP project priorities are set by SHMT. The state has an administrative plan for the HMGP program. The plan defines the roles and responsibilities, procedures, and processes for the program. The North Dakota State Legislature provides up to a 10 percent match for HMGP. NDDES provides technical assistance and administers this grant program for the State. Details on HMGP grant management can be found in Section 6. From 1997 to 2022, North Dakota leveraged HMGP funding 34 times, including seven times since the 2018 Plan Update. **Figure 5.5** shows the history of funding available by disaster through HMGP.

Figure 5.5: HMGP Funding Received in North Dakota (1997 – 2023)

Disaster Number	Disaster Year	Total Funding
1174	1997	$55,715,263
1220	1998	$2,498,825
1279	1999	$15,221,346
1334	2000	$12,422,225
1353	2000	$131,001
1376	2001	$4,521,039
1431	2002	$196,466
1483	2003	$141,000
1515	2004	$800,138
1597	2005	$1,468,552
1616	2005	$140,130
1621	2005	$130,277
1645	2006	$467,014
1713	2007	$487,514
1725	2007	$5,094
1726	2007	$1,615,257
1829	2009	$28,630,867
1879	2010	$1,170,107
1901	2010	$3,469,426
1907	2010	$181,803
1981	2011	$98,626,510
1986	2011	$644,963
4118	2013	$1,252,182
4128	2013	$1,816,325
4154	2013	$985,348
4190	2014	$359,652
4323	2017	$796,032
4444	2019	$2,033,478
4475	2019	$2,605,632

Disaster Number	Disaster Year	Total Funding
4509	2020	$11,357,915
4553	2020	$1,654,933
4565	2020	$485,348
4613	2021	$499,620
4660	2022	$15,959,225*
	Grand Total:	$268,490,507*

*Not all projects selected for 4660 have been obligated

Source: NDDES

HMGP is a well-established program, with well-established policies and procedures that have been refined to meet state, tribal, and local needs. The number of disaster declarations that have occurred since 1998 have allowed for regular and significant funding from this program for hazard mitigation projects in North Dakota. Moreover, these ample funding opportunities are not exclusively limited to disaster areas; all entities statewide can apply. However, the continuity of this program depends on future disasters, making it difficult to plan on using this funding source. The program requirements can be complex to understand, such that eligible applicants can be untrained or unaware of HMGP application requirements. This may lead to applicants submitting incomplete or ineligible applications for NDDES and FEMA to review.

Changes since the 2018 Plan update:

- Continued Authority in PAS Pilot Program
- Shift toward using pre-disaster funding as opposed to post-disaster funding due to smaller, and less frequent, disasters.

Implementation challenges:

- Availability of HMGP is always unknown and unpredictable as it is not only based on having a large-scale natural disaster event that exceeds local and state capabilities, but also receiving a Major Disaster Declaration by the President.
- Lack of interest from State, local, and tribal partners.
- Overall complexity of the programs, including the completion of Benefit Cost Analyses (BCAs).
- Low percentage available for use as Section 324 Management Costs.

Suggested improvements to the program:

- Develop comprehensive outreach materials for statewide dissemination which will create additional awareness of HMA programs as well as a better understanding of application requirements and the formal review process.
- Provide additional training for application development and project management.

5.3.2.1.3 Building Resilient Infrastructure and Communities (BRIC) Program

Administered by: NDDES

The BRIC program replaced the longstanding Pre-Disaster Mitigation (PDM) Program in 2020, and provides a consistent source of funding to state, local, and tribal governments for planning and projects primarily addressing natural hazards relative to community infrastructure. Funding for these plans and

projects reduces overall risks to the population and structures, while also reducing reliance on funding from actual disaster declarations. BRIC provides 75 percent funding of project costs, although communities characterized as small and impoverished can receive up to 90 percent. **Figure 5.6** outlines the PDM and BRIC funding received by the State from 2005 to 2023. After a break in receiving PDM funding from 2009 to 2015 due to the state having a high amount of HMGP dollars available from federally declared disaster events, PDM and BRIC funding has become an increasingly valuable source of constant funding for hazard mitigation projects for North Dakota.

Figure 5.6: BRIC Funding Received in North Dakota (2005 – November 2023)

Year	Total Funding
PDM 2005	$3,139,729
PDM 2006	$10,395
PDM 2007	$366,494
PDM 2008	$440,786
PDM 2009	$505,780
PDM 2015	$227,596
PDM 2016	$3,146,122
PDM 2017	$7,421,539
PDM 2018	$16,761,212
PDM 2019	$3,853,762
BRIC 2020	$722,003
BRIC 2021	$947,421
BRIC 2022	13,353,060*
Grand Total:	**$50,895,899***

*Not all projects selected for FY 2022 funds have been obligated

Source: NDDES

The BRIC program requires a comprehensive HMP to guide future projects and encourages local- and tribal-level mitigation planning and public participation. The BRIC program provides mitigation opportunities, even if federal post-disaster funding is not available, and is a nationally competitive process which strives for consistency across the country. Funding and program priorities change on an annual basis for BRIC; however, the program still provides a reliable source of funding for developing or updating mitigation plans and implementing projects. Conversely, the grant application and selection process for BRIC is lengthy and can discourage some communities from applying. The lengthy time frame between the grant application submission and federal award occasionally delays implementation of timely projects, but efforts are underway to streamline the process. BRIC can also leave funding gaps for beneficial, but not cost-effective mitigation projects, such as early warning sirens or shelter generators that could be funded under HMGP. Many local and tribal HMPs identify these types of mitigation/preparedness projects, but communities cannot apply to fund them under the BRIC program. Since the 2018 Plan Update, this program officially changed from PDM to BRIC, and the program has seen an increase in national funding to the BRIC program, with FY 2020 having $700 million available; FY 2021 having $1.16 billion and FY 2022 $3 billion in available funds for projects that were selected.

Changes since the 2018 Plan update:

- Shift toward using National programs versus HMGP funding due to smaller, and less frequent, disasters.

- As of 2020, the BRIC Program has replaced the PDM Program.
- Two additional BRIC projects were granted for the Cities of Lincoln and Fessenden and their region to update and improve their wastewater systems. The upgrades will be beneficial to approximately 9,000 citizens.

Implementation challenges:

- Lack of interest from State, local and tribal partners.
- Overall complexity of the programs, including the completion of BCAs.
- Applicants can have a potentially high front-end cost to get an application completed due to the requirements of the program and application review criteria, but they have no guarantee that those costs will ever get reimbursed because the program is competitive by nature. Introducing a phased project approach to the national programs would allow for better overall project coordination from start to finish and allow applicants to get those front-end costs reimbursed. This would also generate interest in the programs because it would make the initial application process simpler for applicants to complete and provide the applicants a level of security moving forward with a project that has been approved by FEMA before the preliminary engineering and design phase, not after.
- Availability of programs is annual, but the application period is never static. This can make it hard to rely on this program from a budgeting and scheduling standpoint.
- The timeframe from the application period opening to the actual award can be up to 9 months or potentially longer if a project has a lot of environmental conditions that must be considered. This again makes it hard to rely on this project from a budgeting and scheduling standpoint.

Suggested improvements to the program:

- Provide additional training for application development and project management.

5.3.2.1.4 Flood Mitigation Assistance (FMA)

Administered by: NDDES

The FMA program provides funding on an annual basis so that measures can be taken to reduce or eliminate the risk of flood damage to buildings insured under NFIP. It is a competitive process that is awarded based on cost effectiveness. **Figure 5.7** outlines the FMA funding received by the state.

Figure 5.7: FMA Funding Received in North Dakota (2009 – July 2023)

Year	Total Funding
2009	$12,595,643
2017	$147,762
2022	$101,344,783*
Grand Total:	**$114,088,188***

* Not all projects selected for 4660 have been obligated

Source: NDDES

The Biggert-Waters Flood Insurance Reform Act of 2012 (found in H.R. 4348) eliminated two NFIP-funded mitigation programs, the Severe Repetitive Loss (SRL) program and Repetitive Flood Claim (RFC)

program. Aspects of both the SRL and RFC Programs have been merged into the currently existing FMA program to simplify and broaden the accessibility of all three programs and their activities.

The FMA program specifically targets and offers financial relief for properties suffering regular and repetitive losses through NFIP, focusing on those properties that cause the most losses. Using these criteria, North Dakota currently has 59 FEMA defined NFIP SRL and 78 FMA SRL properties. However, even if the property has not been identified as SRL the program is still available for all NFIP-insured properties that may have experienced losses due to flooding. Unfortunately, many homeowners are not interested in acquisition opportunities if they have not been repetitively flooded, so some program funding may go unused for property acquisitions. FMA also does not provide funding for large scale flood mitigation activities, such as community levee or floodwall systems, which are eligible flood mitigation activities under HMGP and BRIC. Nationally there has been updated guidance providing an option for alternative cost-effectiveness methodology to better support underserved communities in applying for the funding. In 2023, the FMA program had $800 million available for potential projects.

Changes since the 2018 Plan update:

- Shift toward using other sources of other HMA funding sources versus HMGP funding due to smaller, and less frequent, disasters.
- Two FMA projects in the Bismarck-Mandan area to provide flood protection to approximately 20,000 North Dakotans.

Implementation challenges:

- Lack of interest from State, local and tribal partners.
- Overall complexity of the programs, including the completion of BCAs.
- Applicants can have a potentially high front-end cost to get an application completed due to the requirements of the program and application review criteria, yet they have no guarantee that those costs will ever get reimbursed because the program is competitive by nature. Introducing a phased project approach to the National programs would allow for better overall project coordination from start to finish and allow applicants to get those front-end costs reimbursed. This would also generate interest in the programs because it would make the initial application process simpler for applicants to complete and provide the applicants a level of security moving forward with a project that has been approved by FEMA before the preliminary engineering and design phase, not after.
- Availability of programs is annual, but the application period is never static. This can make it hard to rely on this program from a budgeting and scheduling standpoint. The timeframe from the application period opening to the actual award can be up to 9 months or potentially longer if a project has a lot of environmental conditions that must be considered. This again makes it hard to rely on this project from a budgeting and scheduling standpoint.

Suggested improvements to the program:

- Develop comprehensive outreach materials for statewide dissemination.
- Develop a guide of best practices and successes.
- Provide additional training for application development and project management.

5.3.2.1.5 Public Assistance (PA) Grant Program

Administered by: NDDES

FEMA's PA grant program provides federal funding to state, local, and tribal government organizations, and eligible Private Non-Profit (PNP) organizations to reimburse eligible disaster-related expenses following a Presidential disaster declaration. The grants provided through the PA Program are used by the grant recipient (usually the State department of Emergency Services) and eligible subrecipients to reimburse costs associated with debris removal, life-saving emergency protective measures, and the repair, replacement and restoration of disaster-damaged publicly owned facilities, as well as damages to facilities and infrastructure owned and operated by eligible PNP organizations. The federal cost share is generally 75 percent of the eligible disaster-related expenses but can be raised to as much as 90 percent for larger disaster events. States are typically the recipient of PA grants; however, federally recognized Indian Tribes can also be recipients for the PA Program if they choose. Recipients of a PA grant will determine how the non-federal share (generally 25 percent of eligible expenses) will be paid, whether it is entirely the subrecipients (eligible applicants) responsibility, or if the recipient will provide a portion of the non-federal cost share.

The permanent work done to repair, replace and restore damaged facilities under the PA Program is broken down into specific categories of work, primarily Categories C through G. These categories correspond to different types of infrastructure that were damaged by the declared disaster event, including roads and bridges, water control facilities, public buildings and contents, public utilities, and parks/recreational/other facilities.

North Dakota is a PA managing state, meaning that the state is authorized to manage all aspects of PA field operations, including the completion of damage assessments, site inspections, project worksheet development, and the submittal of project worksheets for federal review and approval. FEMA still retains final obligation authority to ensure compliance with environmental and historic preservation laws, while providing technical assistance and quality control reviews for the state. As aforementioned, the typical federal cost share for PA projects is 75 percent. The North Dakota State Legislature also provides up to a 10 percent match for the PA Program, leaving 15 percent as the subrecipient responsibility. In cases where the federal cost share is increased to 90 percent for the PA Program, the state share is normally adjusted to 3 percent, leaving 7 percent as the subrecipient responsibility.

Section 406 Hazard Mitigation funding is also available under the FEMA PA Program and can be used to improve and protect facilities and infrastructure that were damaged by the federally declared disaster event to prevent similar damage in the future. Section 406 Hazard Mitigation work must be cost effective, be reasonably implemented as part of the eligible repair work and be technically feasible in reducing or preventing damage to facilities or infrastructure from future disaster events. Sometimes, a combination of Section 406 and 404 (HMGP) funding may be deemed appropriate if additional funding is required for the mitigation activity to be implemented.

The PA Program funds mitigation work under Section 406 during the completion of permanent facility repairs because Section 406 Hazard Mitigation funding is site specific and only eligible for the damaged sites that were identified and funded under PA categories C through G following a declared disaster event. Additionally, there is increased awareness of hazards immediately following major disasters, so the public, including local officials, may be more open and motivated to implementing mitigation measures

during the recovery period immediately following a major disaster. Recovery, not mitigation, is typically the primary objective of communities immediately following a disaster; mitigation opportunities that would otherwise be funded may be missed due to a focus on repairing damaged infrastructure and returning to normal function. Moreover, identifying mitigation costs versus repair costs can be difficult to document and time consuming for a damaged facility.

Changes since the 2018 Plan update:

- NDDES updated the State Recovery MAOP to ensure the state follows a cohesive, whole community approach to disaster recovery pre and post disaster.
- FEMA continues to update and implement the new Program Delivery Model to improve and streamline the PA Program at the national, state, local, and tribal levels.
- FEMA implemented Section 422 Simplified Procedures to further streamline the PA process and conduct a risk-based approach to project approval.

Implementation challenges:

- Sustaining trained personnel to fill the required roles of the new Program Delivery Model due to lack of available funding to keep a permanent staff.
- The size of future disasters will most likely dictate the ability of the state to sustain state-managed aspects of PA field operations.

Suggested improvements to the program:

- Provide additional training for application development and project management.
- Develop, schedule, and conduct classes to train new reservist personnel for future State Presidential Disaster Declarations.
- Seek additional funding at both the State and Federal government level.

Figure 5.8: Public Assistance Funding Received in North Dakota (1993 – 2023)

Disaster Number	Year	Closeout Date	Current 100 percent Totals
1001	1993	9/14/98	$8,571,646.00
1032	1994	10/1/98	$4,310,380.00
1050	1995	4/6/00	$12,293,559.00
1118	1996	5/10/00	$12,593,103.00
1157	1997	9/14/98	$18,910,011.00
1174	1997	5/13/10	$220,089,708.00
1220	1998	3/8/05	$12,239,524.00
1279	1999	5/13/10	$52,274,232.98
1334	2000	8/10/10	$43,171,922.90
1353	2000	7/10/03	$1,031,341.10
1376	2001	4/4/12	$30,242,080.47
1431	2002	1/25/07	$1,450,730.21
1483	2003	4/6/05	$1,144,553.19
3196	2004	3/10/05	$408,754.01
1515	2004	7/5/12	$16,248,089.49
1597	2005	8/2/12	$18,579,370.43
1616	2005	9/5/08	$2,622,915.82

Disaster Number	Year	Closeout Date	Current 100 percent Totals
1621	2005	6/2/11	$2,537,340.72
1645	2006	10/16/12	$9,477,556.52
1713	2007	2/26/13	$3,766,458.33
1725	2007	3/31/10	$911,890.13
1726	2007	2/26/13	$10,143,540.87
1829	2009	4/3/18	$128,443,637.28
1879	2010	3/12/15	$16,999,869.04
3309	2010	11/19/13	$6,473,729.43
1901	2010	2/12/16	$35,485,534.99
1907	2010	7/24/18	$25,951,012.91
1981	2011	4/5/21	$248,760,517.83
1986	2011	12/8/15	$7,905,925.17
4118	2013	8/20/19	$9,338,810.60
4128	2013	8/26/19	$13,429,504.77
4154	2013	8/26/2019	$5,838,114.00
4190	2014	1/30/2020	$3,111,683.97
4323	2017	12/15/2022	$7,169,205.50
4444	2019	Not Completed	$8,253,412.84
4475	2020	Not Completed	$12,873,605.7
4509	2020	Not Completed	$195,112,470.48
4553	2020	Not Completed	$10,899,964.34
4565	2020	Not Completed	$2,573,886.00
4613	2021	Not Completed	$2,723,209.79
4660	2022	Not Completed	$85,667,322.17
4686	2022	Not Completed	$2,475,539.61
4717	2023	Not Completed	$4,943,452.45

Source: NDDES

5.3.2.1.6 High Hazard Dam Program (HHPD)

Administered by: NDDWR, Office of Dam Safety

HHPD funds are allocated by FEMA to provide federal cost-share grant funds for the purpose of scoping, planning, design and construction assistance toward the rehabilitation of eligible identified high hazard potential dams. This program is newly created, and North Dakota has yet to benefit from the program.

Changes since the 2018 Plan update:

- This program was developed in 2022.

Implementation challenges:

- Identifying and/or establishing eligible dams.
- Communicating the availability of funds to eligible parties.
- Allocation or identifying funding available for non-federal match.

5.3.2.1.7 Community Development Block Grant (CDBG)

Administered by: NDDOC NDDCS

CDBG funds are used to improve communities, particularly low to moderate income communities. Many projects such as property acquisitions and infrastructure improvements can also qualify as hazard mitigation. CDBG funds are unique in that they can be used as grant match in some cases. Historically, CDBG funds in North Dakota have been used for acquisitions following flood events. Grand Forks and Fargo both had substantial acquisition programs using CDBG funds. However, CDBG funding often prioritizes other issues besides hazard mitigation, and the funds are generally limited to low- or moderate-income communities.

Changes since the 2018 Plan update:

- The last grant was closed out in 2018.

Implementation challenges:

- Mitigation is not always a priority for funding.
- Funding is limited to low- or moderate-income communities.
- Community awareness and capacity for grant development required.
- Different requirements compared to other government grants.

Suggested improvements to the program:

- None

5.3.2.1.8 Community Development Block Grant Supplemental-Disaster Recovery (CDBG-DR)

Administered by: NDDOC

The CDBG Supplemental Disaster Recovery (CDBG-DR) funds are to be used toward meeting unmet housing, infrastructure, public service, public facility, and other needs in counties designated as Presidential Disaster areas. **Figure 5.9** displays the amount of CDBG-DR funding North Dakota has received from 1993 to 2018.

Figure 5.9: North Dakota CDBG-DR Funding (1993 – 2023)

Year	Grantee	Total Funding
1993	City of Bismarck	$2,303,000
1993	City of Fargo	$2,069,000
1993	State of North Dakota	$15,035,000
1993	Grand Forks	$219,000
1997	State of North Dakota	$10,200,140
1997	Fargo	$5,943,963
1997	Cass County	$1,400,000
1997	Pembina County	$1,000,000
1997	City of Devil's Lake	$3,500,000
1997	Richland County/Wahpeton	$3,326,264
1997	Walsh County	$504,504
1997	Grand Forks County	$2,176,049
1997	City of Grand Forks	$121,567,707
1997	Mercer County	$500,000
1997	Traill County	$1,000,000

1998	North Dakota	$1,500,000
2011	State of North Dakota	$11,782,684
2011	City of Minot	$67,575,964
2011-2013	State of North Dakota	$6,576,000
2011-2013	City of Minot	$109,396,000
	Grand Total:	**$367,575,275**

Source: United State Housing and Urban Development Agency (HUD), 2017

Changes since the 2018 Plan update:

- The City of Minot has CDBG-DR funding and receives it directly from U.S. Department of Housing and Urban Development (HUD).

Implementation challenges:

- Funding is dependent on a federally declared disaster declaration.

Suggested improvements to the program:

- None

5.3.2.1.9 National Flood Insurance Program (NFIP)

Administered by: NDDWR

The Federal Disaster Protection Act of 1973 requires state and local governments to participate in the NFIP as a condition to the receipt of any federal loan or grant for construction projects in identified flood prone areas. The NFIP has three main elements: hazard identification and mapping, floodplain management, and federal flood insurance. Participation in the NFIP requires communities to adopt floodplain regulations that meet or exceed minimum NFIP standards. In 2012, the Biggert-Waters Reform Act was signed and contains many reforms that will impact the NFIP moving forward. Some of the changes directly impacting flood insurance include the phasing out of subsidies (including grandfathering) and issuing new insurance policies at full-risk rates.

Communities have received assistance through the North Dakota Floodplain Management Act of 1981 which directs the state engineer to aid local governments in reducing flood damage through sound floodplain management.

As of 2023, 336 North Dakota communities and tribal nations participate in the NFIP, of which 322 are in the regular program and eight are in the emergency program (FEMA, 2023). There are 2 communities that are currently being sanctioned and do not participate in the NFIP (FEMA, 2023). All 25 sanctioned communities have identified hazard areas (FEMA, 2023).

Historically, after North Dakota's most significant flood events in 1979, 1997, 2009, and 2011, flood insurance claims spiked upward. Over $260 million dollars in flood insurance claims has been paid within North Dakota over the period of 1978 through 2023. The majority of the claims occurred from the 1997 and 2011 spring floods. Most of the state's flood insurance losses have occurred in the six Red River Valley counties and in two counties bordering Devils Lake. The 2011 flood was different in that it impacted every river basin in North Dakota.

An important strength of the NFIP in North Dakota is the statewide policy of elevating the lowest floor to an elevation no less than one foot above the base flood elevation. The higher standard provides additional protection for structures during floods greater than the 1 percent annual chance flood and is an important and effective flood mitigation strategy across the state for future development.

The NFIP is a critical component of mitigation in the state. Individuals can purchase insurance for floods, and North Dakota has a high level of participation in the program. State law exceeds NFIP minimums addressing elevating on fill or dry floodproofing above the base flood elevation; compliance means eligibility for a letter of map revision. Moreover, model ordinances used in North Dakota exceed minimum NFIP requirements. The companion Risk Mapping, Assessment, and Planning (RiskMAP) program works to improve community flood maps which help strengthen communities' abilities to practice floodplain management. However, NFIP requires local adoption and enforcement of floodplain ordinances. The State NFIP Coordinator supports local and tribal mitigation plans by reviewing communities' NFIP status and guiding development of mitigation action related to program maintenance and enforcement.

Changes since the 2018 Plan update:

- Introduction and promotion of the North Dakota Risk Assessment MapService (NDRAM) tool at seven Community Assistance Visits and during 17 Community Assistance Contacts in the Spring of 2023.
- Since 2018, six more communities participated in the NFIP as of 2023.

Implementation challenges:

- Floodplain management does not always work well at the local level, due to issues such as developer influence and politics.
- Despite new efforts, mapping is often outdated and can lead to inequalities in mapped areas versus unmapped areas.
- In most areas, permits are issued very rarely, so continuing education and active participation are challenges.
- One third of all communities in the NFIP have no flood hazard map.
- State zoning law for cities, counties and townships can confuse the practice of floodplain management in rural areas and where urbanization may be occurring.
- Floodplain management is often just one responsibility among numerous other job duties for community floodplain administrators.
- Community floodplain administrator turnover causes floodplain management inconsistencies as often there is no transition of information.

Suggested improvements to the program:

- Continue working with FEMA to identify and map communities at risk and promote NFIP participation and implementation.
- Support FEMA's goal of doubling the number of properties covered by flood insurance.
- Provide more training to local communities and floodplain administrators who are responsible for regulating floodplain development.

- Encourage local jurisdictions to incorporate higher building standards to create a more flood resilient community.

5.3.2.1.10 Risk Mapping, Assessment, and Planning (RiskMAP) Program

Administered by: NDDWR

Congress passed the National Flood Insurance Act of 1968, thereby creating the NFIP. As a part of making insurance available to citizens, it also required the Federal Government to identify the highest risk areas by creating flood hazard zone mapping and ensure that local communities implement standards for safe development around the highest risk areas when they choose to participate in the NFIP.

Congress appropriated funding for FEMA to implement a five-year "Flood Map Modernization" effort. Map Modernization was a multi-year effort to upgrade the paper Flood Insurance Rate Map (FIRM) inventory into seamless flood hazard data publicly available in a geographic GIS format nationwide. The ability to leverage the resources and expertise of the local communities who had participated in the Cooperating Technical Communities (CTC) Program was an important component of Map Modernization. Additionally, during this time there was an understanding of the need for expansion of the program to include additional partners such as states and regional agencies on a larger scale. As such, the program was renamed to the Cooperating Technical Partners Program. The Cooperating Technical Partners (CTP) Initiative was formally recognized as a Program and from here on is referred to as the CTP Program.

Program Management funding became available under the CTP Program. The program, titled Map Modernization Management Support (MMMS) which was intended to be a five-year grant program and provided program management costs, closely aligned with Map Modernization. The final years of funding for Map Modernization, FY 2008 and FY 2009, served as transition years. In 2009, Congress approved RiskMAP, the successor to Map Modernization. RiskMAP expanded on Map Modernization by providing high-quality flood maps and information and tools to better assess the impacts of the risk from flooding, as well as mitigation planning and outreach support to communities to help them better understand their risk and be able to act to reduce (or mitigate) flood risk. Each RiskMAP flood risk project is tailored to the needs of each community and may involve different products and services.

FEMA started a Base Level Engineering (BLE) effort in 2017 in partnership with the NDDWR to assess county-wide floodplains in the entire state of North Dakota through the RiskMAP program. The project was broken into two phases: phase one kicked off in Summer 2017 and included the 32 eastern counties in the state, and phase two kicked off in Summer 2018 and included the western 21 counties. This BLE effort will create statewide flood risk assessments using elevation data derived from LiDAR information, in combination with powerful geographic analysis software and hydrology modeling techniques.

Since the early 2000s, NDDWR has been partnering with other local and federal entities to fund LiDAR collections for the entire State of North Dakota. Since then, this effort has yielded complete LiDAR coverage statewide. Because of the breadth of LiDAR coverage, FEMA was able to leverage the State's data for the purpose of this 53-county project.

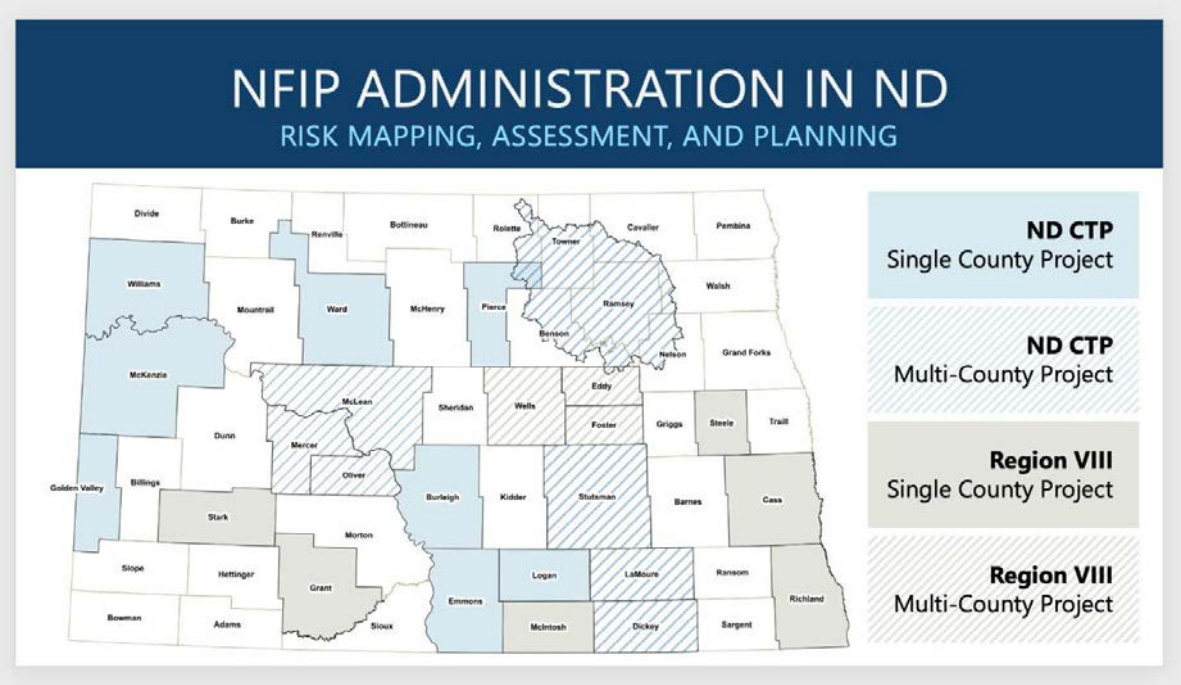
Through the use of this BLE data, every stream, creek, river, or otherwise identified water source will have an identified level of flood risk, with flood elevations that will be provided to every county and city

across the state for use in planning future development and their internal building permit processes. One of the main focuses of this BLE data is a push to help communities and residents better understand where and how to build, in the hopes that this will help prevent damage to public and private property from flooding. In addition, this BLE data can also be used as the best available data for the development of BCAs which are required for FEMA funding through each of the current HMA programs. Without this data, communities would be required to hire engineering firms to identify the same levels of flood information, which can be a very significant cost that many local communities cannot afford without a guarantee that these costs will be reimbursed. This BLE data will help prevent those types of engineering expenses that are required to simply develop a project application for FEMA review and funding, which will also make the HMA application process more accessible for all North Dakota communities, large or small, moving forward.

NDDES has also participated in the Western Cass County and Ward County Community Coordination and Outreach (CCO) meetings which are used to inform communities of their new and completed RiskMap products which will be used for the implementation and enforcement of flood insurance and NFIP building requirements within these participating communities once the final floodplain maps are completed and adopted. As part of these CCO meetings, NDDES presented information on the different available HMA programs and how they can be used to help prevent damages to property and reduce the risk to human life and safety to promote community involvement and generate interest with these programs moving forward.

The NDDWR has served as a FEMA CTP since October 18, 2004, and has one full-time employee dedicated to this program. Base Level Engineering (BLE) has been completed for all counties in North Dakota. **Figure 5.10** shows ND active and completed RiskMAP projects. Since 2005 when the state submitted its first CTP grant application, North Dakota has received approximately $31,043,600 in FEMA Map Mod/RiskMAP funding.

Figure 5.10: Current RiskMAP Projects, 2023



Changes since the 2018 Plan update:

- Promotion of the RiskMap program during the 2021 and 2023 Plan Developers Meetings.

Implementation challenges:

- Lack of consistent federal funding.
- The success of the program depends on the willingness of each community to support the effort and regulate to the new standards.
- FEMA funds one position to oversee all RiskMAP activities. It can be very hard to find a balance for one employee to manage several active grants.

Suggested improvements to the program:

- Continue to strengthen partnership with FEMA to identify and map communities at risk and promote NFIP participation and implementation.

5.3.2.1.11 Community Rating System (CRS)

Administered by: FEMA and NDDWR

The CRS is a voluntary incentive program within the NFIP. Through participation in this program, communities can receive discounts on flood insurance premiums by conducting flood mitigation activities, communicating flood risk, and enforcing standards that exceed NFIP minimum requirements to reduce their long-term risk. Technical assistance for this program is provided by the NDDWR. As of 2023, 12 North Dakota communities are part of the CRS program, which represents 72 percent of all

federal flood insurance policies in North Dakota. Since the previous plan update, no new community has entered the CRS program, and no communities left the program.

Figure 5.11: CRS Communities in North Dakota

Community Name	CRS Entry Date	Current Effective Date	Current Class
City of Bismarck	10/1/17	10/1/17	8
Township of Burlington	05/1/17	05/1/17	8
City of Burlington	05/1/17	05/1/17	8
City of Carpio	05/1/17	05/1/17	9
City of Dickinson	05/1/18	05/1/18	9
City of Donnybrook	05/1/17	05/1/17	9
City of Fargo	05/1/06	10/1/17	5
City of Grand Forks	10/1/91	10/1/01	5
City of Minot	10/1/16	05/1/17	8
City of Sawyer	05/1/17	05/1/17	9
City of Valley City	05/1/17	05/1/17	9
Ward County	05/1/17	05/1/17	7

Source: FEMA, 2023

Changes since the 2018 Plan update:

- None

Implementation challenges:

- This program is beneficial as it provides discounts on flood insurance for the communities that participate. However, limited resources may discourage a community from participating, as the program is voluntary and primarily requires local efforts. Additionally, for communities with only a few NFIP policies, there is little incentive to participate.

Suggested improvements to the program:

- Encourage more communities with significant flood insurance policy numbers to participate in the CRS program.
- Provide more educational services.

5.3.2.1.12 Infrastructure Investment and Jobs Act

Administered by: NDDOT

Also known as the Bipartisan Infrastructure Law, this program created more than $550 billion of grants, mostly DOT-administered to improve the safety and resilience of infrastructure across a broad range of sectors. Sectors with available funding include roads and bridges, road and rail safety, water infrastructure and resource development, power infrastructure, internet access, and hazardous material remediation.

Changes since the 2018 Plan update:

- This program is new as of 2022 and has funding available.

Implementation challenges:

- Identifying eligibility for identified projects to match accurately to the appropriate program.
- Projects are nationally competitive with some money set aside for state administration.
- Assuring compliance and efficient administrative oversight for newly created programs.

Suggested improvements to the program:

- None

5.3.2.1.13 Substantial Damage Administration

Administered by: NDDWR

North Dakota has 337 communities participating in the NFIP. One of the program requirements is substantial improvement/substantial damage determinations. Local floodplain management ordinances require communities to enforce substantial improvement/substantial damage requirements. As a result, residents can purchase flood insurance through the NFIP. Substantial damage requirements apply to damaged structures in the SFHA that have incurred total repair costs of 50 percent or more of a structure's market value. The State NFIP Coordinator provides the oversight and management of the program at the state level and facilitates communication, training, coordination, enforcement, and mitigation with the local jurisdictions. The State NFIP Coordinator also provides substantial improvement/substantial damage (SI/SD) resources to communities, provides guidance on the process, and makes recommendations on how to improve upon the procedures. North Dakota follows the federal guidance and directs local jurisdictions to use FEMA's Substantial Damage Estimator (SDE) tool.

For mitigation, the State NFIP Coordinator collaborates with NDDES and the SHMO and provides a thorough overview of substantial damage and the necessary requirements based on the regulations. Following an event, the two state departments will work closely to support community outreach and potential funding opportunities for communities.

5.3.3 Integration with Local/Tribal Programs and Initiatives

Each hazard and threat profile in this Risk Assessment summarizes data extracted from each of the plans that local and tribal jurisdictions completed. At the time this plan update was developed, 1 city, all 53 counties, and 4 tribal nations had a federally approved plan or had a plan that was under development. Most local and tribal plans in North Dakota use a uniform hazard ranking system of high, medium, and low. The factors used to create this ranking can vary by jurisdiction, though generally each hazard and threat ranking will include the criteria outlined in **Figure 5.12**. The local plan risk assessments were reviewed to extract the hazard and threat rankings and loss estimate information. **Figure 5.13** summarizes the overall hazard and threat rankings from this review as well as the number of local and tribal plans that ranked each hazard high, medium, and low. Some local and tribal plans that were reviewed did not identify a particular hazard or threat, or included the hazard or threat in the plan but did not classify it. The detailed hazard and threat ranking by jurisdiction can be found in the Jurisdictions at Risk sections of each profile.

Figure 5.12: Risk Analysis Criteria

Frequency	
Highly Likely	Nearly 100 percent probability in the next year
Likely	10-100 percent probability in the next year, or at least 1 chance in the next 10 years
Possible	1-10 percent probability next year, or at least 1 chance in the next 100 years
Unlikely	Less than 1 percent probability in the next 100 years
Impact	
Catastrophic	More than 50 percent of jurisdiction affected
Critical	25-50 percent of jurisdiction affected
Limited	10-25 percent of jurisdiction affected
Negligible	Less than 10 percent of jurisdiction affected

Figure 5.13: Local Plan Hazard Ranking Summary

Hazard or Threat	Rank	# Very High	# High	# Medium	# Low	# Not Mentioned
Cyberattack	1	3	5	15	3	32
Flood	2	10	21	22	5	0
Severe Winter Weather	3	9	40	7	1	0
Severe Summer Weather	4	7	39	8	2	2
Fire	5	1	22	27	8	0
Infectious Diseases and Pest Infestations	6	2	13	32	9	2
Drought	7	2	18	30	7	1
Hazardous Materials	8	2	16	33	5	2
Space Weather	9	0	6	14	6	32
Dam Failure	10	0	3	8	38	9
Criminal, Terrorist or Nation-state attack	11	0	1	25	24	8
Geologic	12	0	1	4	31	22
Civil Disturbance	13	0	1	17	9	31
Transportation Incident	14	2	8	30	8	10
Shortage/Outage of Critical Materials	15	0	7	6	3	42
Windstorm	16	0	7	8	4	39
Climate Change	17	0	1	0	1	56
Public Utility Failure	18	0	1	0	1	56

The primary limitation with this methodology is that each jurisdiction, each with its own perspectives and individuals conducting the assessments, determines its risk class for each hazard and threat. In addition, this assessment demonstrates the variation of hazards and threats within the jurisdiction, showing which have the higher disaster potential, rather than as a comparison to other counties or tribal nations. This information is very important for the integration of local and tribal perspectives and hazard and threat assessments, but it does not allow for a very consistent statewide picture.

Potential losses listed in the local plans were also incorporated into the Jurisdictions at Risk section of each hazard and threat profile. Local jurisdictions used a variety of methods to estimate losses, including statewide assessments of losses as well as local methodologies. Ultimately, local and tribal plan updates should include updated potential losses that reflect the changes in development for their jurisdiction.

5.3.4 Fiscal Capacity

Funding for mitigation projects exists from a multitude of sources. Some sources may be specifically designed for disaster mitigation activities, while others may have another overarching purpose that certain mitigation activities may qualify for. Most mitigation funding sources are recurring through legislation or government support; some may be from an isolated instance of financial support. Whenever possible, creative financing is encouraged. Often, additional funding sources are found through working with other agencies and businesses to identify common or complementary goals and objectives. **Figure 5.14** lists the current state mitigation funding sources that are used in North Dakota and **Figure 5.15** shows the current federal mitigation funding sources that are used in North Dakota. **Figure 5.16** shows less traditional funding sources that may be used to fund future mitigation activities.

While mitigation funding opportunities are primarily at the federal level, there are some existing mitigation funding opportunities at the state level. North Dakota also has a disaster financing option which will provide a loan for cash flow to a local government that has experienced a disaster or weather-related event and needs support for the local match requirements. This also provides an additional 10 percent to federal HMGP grants thereby reducing the local share from 25 percent to 15 percent.

Figure 5.14: Current State Mitigation Funding Sources

Name	Description	Managing Agencies	Funding Analysis
Department of Water Resources Cost-Share Program	Provides cost-share assistance for flood control, water supply, recreation, studies, irrigation, bank stabilization, dam EAPs, and technical assistance projects.	NDDWR	In 2021, legislation was advanced to support and create loan opportunities for infrastructure with the creation of the Water Infrastructure Revolving Loan Fund (WIRLF) and continued support of the Infrastructure Revolving Loan Fund (IRLF). This program funds projects that increase resilience of infrastructure.
Cultural Heritage Grant Program	Provides cost-share assistance for local museums and historical societies, including for recovery efforts of historical properties affected by flooding throughout the state.	SHSND	For the 2023-2025 biennium, the State Historical Society will obligate up to $400,000 for this program. Funding priority is given to organizations that have completed the ND Museum Assessment (NDMAP). Past funding has been used for disaster preparedness and implementation of mitigation measures.

Name	Description	Managing Agencies	Funding Analysis
Drought Disaster Livestock Water Assistance	Provides 50% cost-share, with up to $4,500 per project. Eligible projects include new water wells, rural water system connections, pipeline extensions, pasture taps and associated works, labor, and materials and equipment rentals for work completed by the producer to develop new water supply projects.	NDDWR	The enactment of this program helps livestock producers install long term sustainable water supplies for their livestock in times of severe drought.
Hazard Mitigation Revolving Fund	Authorizes NDDES to administer a hazard mitigation revolving fund and to apply for and accept federal grants, in accordance with the Safeguarding Tomorrow through Ongoing Risk Mitigation Act.	NDDES	The fund assists local governments to enact mitigation projects more easily by providing low-interest loans to help match cost shares.
School Construction Loan Program	Provides low-interest loans to school districts to finance building construction and renovation.	DPI	Applications are prioritized based on student occupancy and academic needs of the district, the age of existing structures to be replaced or remodeled, and building design proposals. Projects are based on safety and vulnerability assessments, community support and costs.

Figure 5.15: Current Federal Mitigation Funding Sources (NDDES, NDFS, NDDWR, NDDOT)

Source	Description	Managing Agencies	Funding Analysis
CAP	Provides funding to states to assist communities in complying with NFIP requirements.	FEMA; NDDWR	$7,500 CAP-SSSE funding from FEMA
FMA	Provides pre-disaster funding through national grant competitions to reduce repetitive flood loss properties and implement projects that will reduce or eliminate impacts from flood events to flood insured structures	FEMA; NDDES	See Figure 5.7. This nationally competitive project provided $64 million in federal funding for two Bismarck-Mandan projects providing protection from flood impacts for more than 11,500 homes.

Source	Description	Managing Agencies	Funding Analysis
HMGP	Provides post-disaster mitigation funding.	FEMA; NDDES	See Figure 5.5. Since 1997, NDDES has successfully leverage this fund for projects amounting to $268,490,507.
CDBG-DR	Provides funds for the effects of the 2011 flooding disaster and recovery needs.	NDDOC; HUD	$11.7 million in 2012 and $6.5 million scheduled in 2013; no additional funding has been received since 2013.
Living Snow Fence Program	Provides funding to plant living snow fences along roadways.	FHWA; NDDOT; HMA; FEMA	Currently unfunded.
National Dam Safety Program	Provides funding to the state to promote dam safety.	FEMA	Funding is limited for this program.
RiskMAP	Provides funding to establish or update floodplain mapping.	FEMA; NDDWR	Total $31,043,600 program funding.
National Fire Plan/ Wildfire Mitigation	Provides pre-disaster funding for primarily wildland fire mitigation, but also wildfire planning. Most of the funding in North Dakota has been used for equipment.	USFS; NDFS	In 2022 $180 million was available and in 2023 an additional $228 million was provided per the Bipartisan Infrastructure Law
BRIC Program	Provides pre-disaster grants through a competitive process for mitigation projects, including planning and capacity building	FEMA; NDDES	See Figure 5.6. The nationally competitive program in 2022 provided $10.5 million project to replace The City of Lincoln lagoon system with a regionalized system with the City of Bismarck. The City of Fessenden received $3 million to upgrade its wastewater lagoon system.
PA (C-G) and Section 406	Following a disaster, funds can repair and mitigate hazards to damaged property of government organizations and certain PNPs.	NDDES; FEMA Region VIII	See Figure 5.8. NDDES staff managed 44 federal disasters, seven of which are open disasters, during 1993 to 2023.

Figure 5.16: Potential Federal Mitigation Funding Sources

Name	Description	Managing Agencies
AmeriCorps	Provides funding for volunteers to serve communities, including disaster prevention.	Corporation for National and Community Service
Assistance to Firefighters Grant	Provides funding for fire prevention and safety activities and firefighting equipment.	DHS
BRIC Program	Provides grants through a competitive process for specific mitigation projects, including planning.	FEMA; NDDES
Clean Water Act Section 319 Grants	Provides grants for a wide variety of activities related to non-point source pollution runoff mitigation.	EPA
CDBG	Provides funding for sustainable community development, including disaster mitigation projects.	HUD
Economic Development Administration (EDA) Grants and Investments	Invests and provides grants for community construction projects, including mitigation activities.	U.S. Economic Development Administration
EMPG	Enhances and sustains all-hazard emergency management capabilities, including mitigation.	NDDES FEMA
Emergency Watershed Protection	Provides funding and technical assistance for emergency measures such as floodplain easements in impaired watersheds.	USNRCS
Environmental Quality Incentives Program	Provides funding and technical assistance to farmers and ranchers to promote agricultural production and environmental quality as compatible goals.	USNRCS
FMA	Provides pre-disaster funding for repetitive flood loss property reduction.	FEMA; NDDES
Hazardous Fuels Mitigation Program	Provides funding for the reduction of hazardous wildfire fuels.	U.S. Bureau of Land Management
HMGP	Provides post-disaster mitigation funding.	FEMA; NDDES
Homeland Security Grants	Through multiple grants, provides funding for homeland security activities. Some projects can be considered mitigation.	NDDES U.S. DOJ DHS

Name	Description	Managing Agencies
HUD Grants	Provides several grants related to safe housing actions.	HUD
Individual Assistance	Following a disaster, funds can mitigate hazards when repairing individual and family homes.	NDDES FEMA – Region VIII
Law Enforcement Support Office 1033 Program	Provides surplus military property to local law enforcement agencies.	NDNG
National Wildlife Wetland Refuge System	Provides funding for the acquisition of lands into the federal wildlife refuge system.	USFWS
North American Wetland Conservation Fund	Provides funding for wetland conservation projects.	USFWS
NRCS Conservation Programs	Provides funding through several programs for the conservation of natural resources.	USNRCS
Partners for Fish and Wildlife	Provides financial and technical assistance to landowners for wetland restoration projects in "Focus Areas" of the state.	USFWS
Public Assistance (C-G)	Following a disaster, funds can mitigate hazards to damaged property of government organizations and certain PNPs.	NDDES FEMA-Region VIII
Rural Development Grants	Provides grants and loans for infrastructure and public safety development and enhancement in rural areas.	USDA Rural Development
Rural Fire Assistance Grant (RFA)	Funds fire mitigation activities in rural communities.	National Interagency Fire Center
SBA PDM Loan Program	Provides low-interest loans to small businesses for mitigation projects.	U.S. Small Business Administration (SBA)
Small Flood Control Projects	Authority of USACE to construct small flood control projects.	USACE
Streambank and Shoreline Protection	Authority of USACE to construct streambank stabilization projects.	USACE

Name	Description	Managing Agencies
Wetland Program Development Grants (WPDGs)	Provides funding for studies related to water pollution prevention.	EPA
Water pollution control and drinking water revolving loan fund programs	Provides loan assistance for conventional wastewater, non-point pollution control and drinking water infrastructure improvement needs.	NDHHS; EPA
Watershed and Flood Prevention Operations Program	Provides technical and financial assistance to states, local government, and tribes to plan for and execute watershed project plans.	NRCS

This list of potential funding sources is certainly not all inclusive. Opportunities for mitigation funding from other sources may exist. Additionally, state agencies continue to identify and work with foundations and non-government entities to secure outside funding for mitigation purposes.

An example of pursuing alternative funding sources is the success of the City of Minot in pursuing the NDRC to provide resilient solutions for recovering from flooding, mitigating future risk, and providing affordable housing in the impacted areas. HUD sponsored the two-phase competition for communities and states with unmet needs from disasters that occurred between 2011 and 2013. Minot competed successfully in both phases of the competition and was awarded $74 million in January 2017. Minot held more than 60 public meetings in the city and throughout the Souris River Basin during the competition to design projects to address the recovery and mitigation needs from flooding disasters, as well as address affordable housing, economic, and transportation needs in the impacted areas. Infrastructural solutions were identified that included grey and green infrastructure, as well as non-structural elements to reduce the identified risks and ensure the areas were resilient to impacts from climate change. Projects also identified affordable housing solutions to ensure the residents who took part in the buy-out program were able to stay in Minot. Additionally, projects focused on economic resilience and diversification, including developing a Center for Technical Education, relocating the Minot State University Art Department Complex, and relocating and developing a new social services facility in the new City Hall.

Many of the federal grants have a cost sharing requirement. In some cases, the state provides a portion of this funding; however, the local governing bodies or subrecipients must also cover a percentage of the project. Often, in-kind services cover this local match, but in the case of some of the larger projects, local sales taxes or mil levies have been used. Entities, such as the rural electric cooperatives, often provide cash match or in-kind services for their projects.

In general, there are many strengths to the mitigation funding sources for North Dakota. The state provides a monetary match in many cases. The state can leverage funding from the state emergency fund for mitigation. However, there are a couple of noticeable weaknesses in these mitigation funding sources. This includes the fact that the local match requirement can be a large deterrent in some communities. Some communities do not have a clear understanding of what is eligible for a local match and all jurisdictions may not be able to generate income for mitigation purposes. Lastly, most of the

current funding sources require studies and design prior to the grant application; these studies and designs can be costly for local jurisdictions for projects when funding is not guaranteed.

While additional analysis of Loss Avoidance is a mitigation action, the state has conducted a simplified analysis as to the benefits of mitigation funding in the form of avoided losses, shown in **Figure 5.17**. In total, funding between 2018 and 2019 in the HMGP and Pre-Disaster Mitigation program resulted in $53,151,604.30 in losses avoided at a cost of $34,012,496.70 in combined federal, state, and local funding. Benefits for the same projects total $87,164,101.00, despite no BRIC projects completed in the state since the program's creation in 2020.

Figure 5.17: Losses Avoided from Hazard Mitigation Funding

Hazard Mitigation Grant Program			
DR-4444 2019 Spring Flood			
Title	**Approved Cost**	**Benefits**	**Losses Avoided**
Stanley Lift Station	$ 122,827.23	$406.609.00	$ 283,781.77
Kulm Water Tower Generator	$ 37,443.00	$ 331,401.00	$ 293,958.00
NDDES Critical Facility Generators	$ 1,301,322.15	$ 1,689,280.00	$ 387,957.85
	$ 1,461,592.38	**$ 2,020,681.00**	**$ 559,088.62**
DR-4475 2019 Fall Flood			
Title	**Approved Cost**	**Benefits**	**Losses Avoided**
Cass County Buyout	$ 570,900.00	$ 2,444,898.00	$ 1,873,998.00
Cavalier Co Mt Carmel Dam Storm Shelter	$ 187,635.00	$ 335,993.00	$ 148,358.00
Bismarck Lift Station Generator	$ 236,250.00	$ 285,190.00	$ 48,940.00
Elgin Storm Shelter	$ 111,671.52	$ 237,038.00	$ 125,366.48
LaMoure County Storm Shelter	$ 94,197.00	$ 407,327.00	$ 313,130.00
Steele Co Golden Lake Storm Shelter	$ 172,830.00	$ 605,634.00	$ 432,804.00
Tri County WD Generators	$ 277,322.50	$ 791,107.00	$ 513,784.50
McIntosh Co Generators	$ 106,612.01	$ 126,868.00	$ 20,255.99
Bismarck FD Generator	$ 152,775.00	$ 168,501.00	$ 15,726.00
	$ 1,910,193.03	**$ 5,402,556.00**	**$ 3,492,362.97**
DR-4509 COVID-19			
Title	**Approved Cost**	**Benefits**	**Losses Avoided**
West Fargo Acquisition/Demolition	$ 1,665,573.00	$ 7,345,053.00	$ 5,679,480.00
Bismarck Public Health Generator	$ 155,989.18	$ 246,018.00	$ 90,028.82
Grand Forks Vail Circle Storm Sewer Project	$ 8,610,637.50	$ 17,825,913.00	$ 9,215,275.50
	$ 10,432,199.68	**$ 25,416,984.00**	**$ 14,984,784.32**
DR-4553 2020 Spring Flood			
Title	**Approved Cost**	**Benefits**	**Losses Avoided**
Milnor Water Supply Generator	$ 115,500.00	$ 136,109.00	$ 20,609.00
Steele Co Road 5 Bridge	$ 671,000.00	$ 803,976.00	$ 132,976.00
City-County Health Generator - Barnes	$ 98,752.50	$ 123,552.00	$ 24,799.50
	$ 885,252.50	**$ 1,063,637.00**	**$ 178,384.50**

DR-4565 2020 Summer Flood			
Title	**Approved Cost**	**Benefits**	**Losses Avoided**
Nelson Co Stump Lake Storm Shelter	$ 95,329.00	$ 373,743.00	$ 278,414.00
Harvey Water Treatment Plant	$ 148,413.76	$ 467,510.00	$ 319,096.24
Silver Lake Recreation Area Storm Shelter	$ 241,605.00	$ 1,606,667.00	$ 1,365,062.00
	$ 485,347.76	**$ 2,447,920.00**	**$ 1,962,572.24**
DR-4613: 2021 Summer Flood			
Title	**Approved Cost**	**Benefits**	**Losses Avoided**
Grand Forks Co Acquisition	$ 471,660.00	$ 1,368,943.00	$ 897,283.00
	$ 471,660.00	**$ 1,368,943.00**	**$ 897,283.00**
DR-4660 2022 Winter Storm and Flood			
Title	**Approved Cost**	**Benefits**	**Losses Avoided**
Minnkota Power Bank Stabilization	$ 927,650.00	$ 1,308,374.00	$ 380,724.00
Mountrail Co Residential Storm Shelter	$ 9,012.15	$ 14,280.00	$ 5,267.85
	$936,662.15	**$1,322,654.00**	**$ 385,991.85**

Pre-Disaster Mitigation Program

2018			
Applicant	**Approved Cost**	**Benefits**	**Losses Avoided**
Fargo Pump Station Flood Mitigation	$ 4,753,290.00	$ 10,991,469.00	$ 6,238,179.00
Burleigh County U of Mary Slope Stabilization PH II	$ 5,286,955.80	$ 20,279,189.00	$ 14,992,233.20
City of Mandan Emergency Generators	$ 309,843.25	$ 1,343,968.00	$ 1,034,124.75
City of Jamestown James River Bank Restoration	$ 911,809.44	$ 1,418,925.00	$ 507,115.56
Mckenzie County Storm Shelters	$ 115,765.63	$ 154,822.00	$ 39,056.37
Beulah Storm Shelters	$ 94,966.13	$ 187,496.00	$ 92,529.87
City of Fargo Wastewater Treatment Plant Flood Protection	$ 4,906,390.00	$ 8,000,127.00	$ 3,093,737.00
	$ 16,379,020.25	**$42,375,996.00**	**$ 25,996,975.75**
2019			
Applicant	**Approved Cost**	**Benefits**	**Losses Avoided**
Beulah Floodway Property Remediation Project	$ 86,185.60	$ 276,000.00	$ 189,814.40
Walsh County United Medical Center Generator	$ 916,414.00	$ 1,429,537.00	$ 513,123.00
Walsh County Admin Bldg. Emergency Generator	$ 47,969.35	$ 78,695.00	$ 30,725.65
	$ 1,050,568.95	**$5,744,730.00**	**$ 4,694,161.05**

Building Resilient Infrastructure and Communities

2020			
Applicant	**Approved Cost**	**Benefits**	**Losses Avoided**
No construction projects			
2021			

Applicant	Approved Cost	Benefits	Losses Avoided
No construction projects			

5.3.4.1 Direct Mitigation Funding

5.3.4.1.1 Repetitive Loss and Severe Repetitive Loss Funding

Previously, FEMA Repetitive Flood Claims and SRL Programs were authorized to provide funding specifically for Repetitive Loss (RL) and SRL properties (FEMA, 2015). In July 2013, the Biggert-Waters Flood Insurance Reform Act of 2012 (BW-12) eliminated these programs (FEMA, 2015).

Currently, funding to mitigate the risk to RL and SRL properties can be gained from FEMA's HMA programs. While funding from all of the HMA programs can be used for RL and SRL properties, the FMA program specifically focuses on mitigation risk to RL and SRL properties, as consistent with the BW-12 (FEMA, 2017). As outlined in Section 5.3.2.1.4, NDDES has been awarded FMA grants in the past, and actively promotes the FMA grant program annually. Use of these funding programs and active floodplain management policies have resulted in no SRL properties identified within North Dakota at the time of this plan's development.

Like FEMA HMGP and BRIC programs, while not targeting RL and SRL properties specifically, many of the funding opportunities discussed in Section 6.3.3 can be utilized in reducing the burden of repetitive losses on the NFIP.

5.3.4.2 Management of Federal Mitigation Funding

North Dakota obtained Enhanced status, or Program Administered by State, in 2019, placing the responsibility of HMGP funding in the authority of the NDDES. As part of PAS status, North Dakota is responsible for the review of Benefit-Cost Analysis and changes to the Scope of Work. FEMA maintains some administrative responsibility while delegating prioritization and management of funds to the state.

5.3.4.3 Indirect Mitigation Funding

NDDES can assist state, local, and tribal partners with identifying and developing projects for other programs where there may be more opportunity, or where the project may be more competitive. Mitigation actions identified in this plan and developed by partners may not be the most competitive for funding programs administered by NDDES or even a public source. NDDES can help identify appropriate programmatic matches or administrative authorities in other departments that can direct developed projects into more successful funding programs. Projects or programs mitigating drought, transportation incidents, criminal attacks, and infectious diseases or pests, or those impacting critical infrastructure and power utilities may find more successful matches in other programs. Funding for road and rail improvements may be capable of being expanded to include improvements that address mitigation actions. Other opportunities may exist to integrate mitigation actions to programmed funding including the integration of public education about hazards into education and adult education programs or integration of identified projects into large facility master plans and capital improvements.

5.3.5 Political Capacity

North Dakota has outlined effective laws that have been approved by the 68th Legislative Assembly with their Century Code. Title 37-Military, Chapter 37-17.1 provides for governance of Emergency Services. Within this chapter, 37.17.1-11 disaster or emergency mitigation is addressed and states that the governor shall consider, on a frequent basis, mitigation actions that can be implemented to reduce the loss of life and property in North Dakota (2023). This section also empowers state agencies having emergency services responsibilities with the ability to conduct analyses of disaster or emergency mitigation. The Code also provides for NDDWR to identify areas of mitigation for land shifting, subsidence, flood or catastrophic events. This includes conducting studies and analyses that focus on gathering data to support mitigation efforts. Based on the analyses the governor has the ability to present recommendations and, if he deems appropriate, request that the state legislators mandate the recommendations as requirements by law.

Century Code has also created a state disaster relief fund to be utilized by legislative appropriation for providing a state cost share to support emergency management in all phases to include mitigation. Chapters 37-17.1-30, 1-31, and 1-32 provide for the creation of the hazard mitigation revolving loan fund to provide for coordination of hazard mitigation activities within the state. This includes the administration of these funds to include the application process, enter into contractual agreements, under the purposes of the Safeguarding Tomorrow through Ongoing Risk Mitigation (STORM) Act. The ability, if authorized, allows the adjutant general to borrow funding from the Bank of North Dakota to match the federal funds for execution of the hazard mitigation revolving loan fund.

Overall, the state has built a political support system to provide for the implementation of mitigation through governance and finances.

5.3.6 Opportunities

North Dakota has made great strides in their mitigation capabilities since the last plan update. The State continues to utilize a variety of funding sources, including a higher proportion of non-disaster dependent funding sources that help make mitigation funding more consistently available. NDDES is committed to making the process of hazard mitigation as streamlined as possible, integrating the THIRA process and EMAP requirements into the Enhanced Mitigation MAOP, thus giving more resources to implementing the mitigation strategy. North Dakota achieved PAS status in 2017, which has also contributed to enhancing their grant management capabilities since the last update. NDDES also works in concert with federal, state, local, and tribal agencies, non-profit organizations, associations, and businesses to integrate HMA planning and project initiatives at every level to improve the effectiveness and implementation of all HMA programs.

Just as data from other state plans and programs was integrated into this mitigation plan, information from this plan has been integrated into other plans and programs. Mitigation planning and activities have been a part of North Dakota state government for many years; therefore, many other plans, programs, and legislation already have mitigation concepts integrated into them. The Capabilities Analysis discussed existing programs and partnerships in North Dakota that coordinate to advance principles of risk reduction, resilience, and mitigation. Mitigation has become embedded in state

planning, decision making, and development, and other state agency planning initiatives help to inform the state's overall mitigation strategy. The SHMT plays a critical role in this process and will continue to integrate hazard mitigation information into their agency plans and programs and those of their partner agencies.

5.4 Conclusions on Local and Tribal Mitigation Capabilities

Most mitigation takes place at the local and tribal levels. The jurisdictions typically understand the local problems best, develop creative solutions for mitigating their problems, apply for grant funding, come up with a portion or all of the grant match, and implement the projects. Since much of North Dakota is rural with limited local and tribal government resources, accomplishing mitigation is challenging. In many cases, the local emergency manager or elected or appointed officials coordinate the mitigation efforts with input from other local government employees. In many cases, these positions are part-time. Even in communities with full-time emergency managers, their job responsibilities extend far beyond mitigation and include many other aspects of emergency management. Without the support of their local officials, mitigation can become a low priority.

Local and tribal governments have shown their commitment to mitigation through past successes, the development of their local mitigation plans, and participation in the development of this Enhanced Mitigation MAOP update. Following a disaster, local jurisdictions regularly assist the Interagency Hazard Mitigation Team and attend SHMT meetings when invited.

The local mitigation expectations and responsibilities are:

- Develop, update and implement their local mitigation plans, supplements and updates.
- Provide input to the state Enhanced Mitigation MAOP and programs.
- Adopt appropriate hazard mitigation measures including land use and construction standards.
- Apply for mitigation grant funding and conduct specific mitigation activities identified in their local mitigation plans.

Ideally, all communities would participate in some form of hazard mitigation; however, due to differences in local capabilities and priorities, the degree of participation varies greatly from community to community. The status of local mitigation planning can be seen in Appendix H. The capabilities of local and tribal governments in North Dakota vary widely from the large cities that have hundreds of employees to townships with volunteer boards. The size of a jurisdiction, however, is not typically a good indicator of its mitigation effectiveness. Every jurisdiction is unique in its capabilities and needs, but the common strengths, weaknesses, emerging capabilities, and needs in many jurisdictions vary.

The results of the local plan roll-up are summarized in Appendix H. This analysis reiterates the sentiment that the local jurisdictions of North Dakota have variable, but generally strong capabilities. This includes 53 percent of local and tribal jurisdictions participating in the NFIP, 3 percent participating in CRS, 52 percent administering zoning ordinances, 29 percent administering subdivision regulations, 41 percent having adopted building codes, 24 percent having a comprehensive plan, 21 percent having capital improvement plans, 21 percent having a full-time planner, 7 percent having a full-time engineer, and 21 percent having a full time Certified Floodplain Manager.

Strengths of Local and Tribal Capabilities:

- High level of local institutional knowledge in many jurisdictions.
- Due to a high number of recent disasters, many local officials, emergency managers, and the public are aware of the need for mitigation and possible solutions for their jurisdictions.
- Creative funding solutions such as local sales taxes or mill levies.
- Local and tribal governments have the authority to perform most mitigation activities.
- State and local training programs.
- Educational resources available.
- Generally, local officials and the public care deeply about their communities and can provide a great deal of support for mitigation activities.

Weaknesses of Local and Tribal Capabilities:

- The time-consuming nature of recent disasters has overwhelmed jurisdictions both financially and with personnel time. Emergency managers do not have as much time to devote to mitigation.
- Many local and tribal emergency managers are part-time with many other areas of responsibility and priorities that may take precedence.
- Many small jurisdictions exist, such as townships and cities with less than 100 people, that don't have the staff capabilities to undertake mitigation in their jurisdictions.
- Jurisdictions have many other competing priorities for their time and financial resources.
- Complexities and regional nature of the major flood areas (Red River, Devils Lake and Mouse River Basins) require a large time commitment and coordination with many other jurisdictions to find effective solutions; simple, local solutions are generally not effective for the larger problems.
- Not enough local land use planners in the state.
- High turnover rates for local officials and emergency managers can slow mitigation progress.
- During periods of low disaster activity, the need for mitigation, based on public perceptions, can become less important.
- Projects and concepts that have very little public support are not usually implemented.
- The capability to implement, execute, govern and enforce zoning laws can be very limited.
- Townships have zoning authority, so this can make county-level zoning difficult if not impossible.
- Many jurisdictions do not have a clear understanding of program requirements (such as acquisition and the NFIP).
- Local NFIP enforcement can be difficult and politically charged.
- Problems often result when a lack of clear and consistent direction from federal and state government is present.
- The local match requirements of many grants can be cost prohibitive in some communities.
- The THIRA in local plans lack depth.
- The lack of implementation of HMPs is an issue, as well as plans expiring.
- The inability of local jurisdictions to execute land use mandates or recommendations without state or federal incentives.

Emerging Local and Tribal Capabilities:

- Growing and improving relationships with the regional councils and the associated regional mitigation plan possibilities.
- Local officials are continuing to grasp the importance of mitigation, its definition, and program eligibility requirements.
- Zoning, comprehensive planning and other land management policies are all local decisions, and the state does not have control over these policies. In jurisdictions such as townships with very few government resources, adopting and enforcing these policies, such as floodplain management, can be particularly problematic. Understanding these limitations, the state places a priority on public education and awareness to assist local governments in making informed and responsible decisions.

Additional Needs:

- Qualified local contractors for mitigation planning assistance.
- Continued mitigation and grant application training.

Local communities have a variety of capabilities and funding opportunities for hazard mitigation projects. While some jurisdictions have a greater capacity than others, all local jurisdictions are beginning to develop hazard mitigation practices. A huge accomplishment for developing a culture of mitigation throughout North Dakota is all jurisdictions having either a FEMA-approved HMP or an HMP under development. Moreover, many local jurisdictions have taken advantage of federal grant programs to fund their mitigation projects. Given these improvements, there are still a variety of limitations to the local and tribal mitigation capabilities that the state will continue to actively address.

A major hurdle voiced by many local and tribal hazard mitigation teams is limited funding which can undermine the efficacy and impact of local mitigation programs and policies. Without adequate funding, the jurisdictions cannot enact measures to increase resilience. The smaller jurisdictions that comprise the majority of cities in North Dakota see limited revenue generated from such sources as property and sales tax, utility fees and special assessments. While the state's larger cities and oil producing counties are recording an increase in population, many smaller cities are seeing outmigration. The state's larger cities are seeing population increases as the state's aging population moved to metro areas where healthcare is more readily accessible. Additionally, most jurisdictions are limited in staff with many only having an auditor in place and volunteer city commissions. Capabilities, therefore, vary by jurisdictional size, as illustrated in the 2020 Cass County mitigation plan. The City of Fargo has been able to invest significantly into its infrastructure to accommodate growth and better prepare for natural disasters while the smaller City of Gardner lacks an underground storm water system needed to reduce damages to private property and public infrastructure.

Local and tribal mitigation teams recognize the value of building codes and zoning ordinances as effective mitigation tools, but they often lack resources required to hire personnel for enforcement. Often building codes are outdated. Limited funding also restricts the capability to develop comprehensive and capital improvement plans that could create a vision that would incorporate local mitigation policies and data from the local mitigation plans. However, the Governor's Main Street Initiative is supporting these communities with its goal to create vibrant cities that attract and retain a

21st century workforce. Many State Hazard Mitigation Team partners support this initiative by providing tools and resources.

As communities strive to be inclusive, particularly in light of new federal requirements emphasizing equity, they struggle with identifying underserved populations in their communities and then strategizing on how they can recruit them to join mitigation planning efforts. Many local and tribal mitigation planning teams worry about the most culturally sensitive way to engage these communities so they can understand their concerns about hazards and how climate change disproportionally impacts the residents. Communities often lack staffing and capacity to conduct sustained outreach and engagement with all populations, including those who are vulnerable. The unfamiliarity points to the need for training on navigating equity mapping tools and using people first language.

Local and tribal mitigation planning teams began efforts in 2023 to adjust to new federal mitigation planning requirements that emphasize climate variability and potential climate change. The biggest obstacle identified was the lack of expertise to understand the long-term implications of climate change. To that end, NDDES employed a retired National Weather Service Warning Coordination Meteorologist to work with the SHMT and local and tribal planning teams to assist with climate change analysis.

NDDES works diligently to support the jurisdictions statewide with their local and tribal mitigation programs to capitalize on their strengths and increase their abilities to enhance their programs. Currently, NDDES staff provides the following services and trainings to support local jurisdictions:

- Offers annual G318 Mitigation Planning Workshops that include state specific examples and presentations from partners such as the State Historical Society, Fire Marshal's Office, and the Department of Water Resources.
- Offers annual IS-235 Emergency Planning Courses, which include discussion on the importance of planning in all phases of emergency management, including mitigation planning. This course highlights the six-step planning process along with factors that should be included when selecting a planning team, research considerations, and how to write an actionable plan.
- Offers Introduction to NDDES courses twice a year highlighting mitigation planning and Hazard Mitigation Assistance during the planning portion of the course. Planning staff presents on the process that many jurisdictions take to initiate the mitigation planning process and move toward approval.
- Coordinates with local and tribal partners to host Community Coffees to elicit feedback from underserved populations and other sectors of the community whose voices may not have previously been represented in mitigation planning.
- Attends local and tribal mitigation planning meetings virtually or in-person if time allows. Planners field questions throughout the meetings to supplement local efforts and build efficiency.
- Organizes regularly scheduled Plan Developers meetings for emergency managers, private plan developers, SHMT Team, and NDDES Staff. These presentations highlight new trends, changes, and other educational opportunities that assist in mitigation planning. Plan Developers meetings also offer the opportunity to promote available grants from partners.
- Developed a Hazard Mitigation Toolbox as a resource for local, tribal, and state planning teams. The toolbox is posted on NDDES' website and is readily available.

- Promotes involvement of local and tribal emergency managers through public outreach by identifying potential underserved populations to be engaged. Local and tribal emergency managers also engage with state and federal initiatives to provide perspectives such as the Grand Forks emergency manager who joined a panel discussion on planning resources during one of the Main Street Summits.
- Conducts one-on-one meetings before, during, and as the mitigation planning process concludes for approval of the plan.
- Hosts guest reviewers from other state agencies such as the ND Department of Agriculture and ND Geological Survey.
- Initiated and maintains a publication, Mitigation Matters, which is shared through NDDES Insights newsletter that works to educate NDDES stakeholders on grant opportunities, mitigation projects, and key mitigation planning elements.
- Works with internal strategic communication staff to disseminate public press releases containing pertinent information relating to mitigation through multiple media platforms.
- Aligns closely with local and tribal emergency managers to create strong working relationships based on trust. These relationships often create a welcoming space for plan developers to ask questions or find needed information for building resilience.

6 Mitigation Strategy

6.1 Direction of the State's Mitigation Strategy

6.1.1 Strategy

The North Dakota Department of Emergency Services (NDDES), in partnership with the State Hazard Mitigation Team (SHMT), has developed a comprehensive, statewide mitigation program, and was the first state in Region VIII to achieve an Enhanced State Hazard Mitigation Plan. The mitigation strategies are articulated by the goals, and more importantly, the objectives of this plan.

Actions developed for each hazard are not all inclusive and the state reserves the right to modify actions, objectives, and goals as necessary to address mitigation needs as they arise. Future occurrences, new technology, or unforeseen events could result in the modification of actions outlined in this plan. Even though a potential project may not be listed in this plan as a specific mitigation action, the state will still aid in completing the project as if it were a project listed in this state mitigation plan. NDDES will support mitigation actions that can be classified under the following mitigation categories:

1. Planning and Regulatory Mitigation Actions
2. Structural and Infrastructure Mitigation Actions
3. Nature Based Mitigation
4. Public Education, Technical Assistance, and Partnerships
5. Other Mission Areas

The NDDES team and the SHMT recognize the value of actions that may not be mitigation in nature, but nonetheless support reduction of the effects of damaging events. For example, some actions are preparedness in nature, but quality preparedness is key to successful response, just as quality mitigation eases the societal burden of disaster response. The NDDES team recognizes that many SHMT members, within their daily roles, operate in other phases of emergency management and serve as SHMT members to share their knowledge, experience, and subject matter expertise to the NDDES team that is exclusively within the mitigation phase. It is the last category, Other Mission Areas, that successfully captures and accounts for these additional actions that support a resilient state and exceed the traditional scope of mitigation actions.

6.1.1.1 Short-term Strategy

Short-term strategies are objectives and actions that will be implemented upon plan approval and the allocation of funds if needed throughout the lifecycle of the plan, and can be

completed within three to five years, or before the 2029 Mitigation Plan update. The NDDES short-term strategy is to maintain the established program by continuing their most successful mitigation actions that are aligned with and support each objective. In addition to this continuation of ongoing actions, there is a corresponding assessment of the effectiveness of these actions to inform the long-term strategy.

6.1.1.2 Long-term Strategy

Long-term strategies are objectives and actions which require more than five years to complete; however, significant actions and progress to begin building the foundation for future success can begin during this plan update. Long-term strategies may take ten or more years to attain, but the actions taken over the next five years will lead to the accomplishment of these objectives. As we build on successful mitigation programs, the State Hazard Mitigation Team looks to improve those programs and to align with new opportunities, initiatives and emergent technologies as they become available.

6.1.2 Mitigation Program Goals and Objectives

Goal 1: Elevate hazard mitigation planning for state, local, and tribal jurisdictions.

- **Objective 1.1:** *Strengthen the 53 county, two city and four* tribal hazard mitigation plans as they come due for updating to serve as valued resources for integrating other community planning and risk reduction initiatives.*
- **Objective 1.2**: *Partner with 53 county, two city and four* tribal hazard mitigation planning teams to incorporate climate variability and potential climate change objectives into their local hazard mitigation plan.*
- **Objective 1.3:** *Host annual hazard mitigation planning trainings and/or workshops for local and tribal emergency management professionals, first responders, planning staff, subject matters experts, partners and elected officials.*

  **Please note: the Sisseton Wahpeton Oyate work directly with South Dakota Office of Emergency Management on plan development.*

Goal 2: Enhance and expand public education and understanding of natural hazard risks and vulnerabilities within a changing climate, and the importance of developing effective mitigation and adaptation solutions within the whole community.

- **Objective 2.1:** *Leverage partnerships with subject matter experts and industry professionals to deliver hazard mitigation guidance, tools, and resources in a robust and engaging format.*
- **Objective 2.2:** *Target vulnerable and underserved populations when conducting outreach sessions across the state of North Dakota.*
- **Objective 2.3:** *Partner with local and tribal community leaders, emergency managers and the State Hazard Mitigation Team to engage in periodic plan developers' meetings*

as well as in equity mapping sessions to enhance awareness of underserved populations to be addressed in mitigation planning.

- **Objective 2.4:** *Deliver public education and awareness information in new and/or already utilized mediums to promote efficiency and integration of emerging technology to reach more North Dakotans.*
- **Objective 2.5:** *Establish outreach pathways to organizations to reach identified underserved populations through community outreach based upon equity mapping findings.*

Goal 3: **Improve disaster resilience to current and future buildings, structures, and infrastructure systems.**

- **Objective 3.1:** *By the end of the next biennium, update, adopt, and maintain the North Dakota State Building Code in conjunction with the release of updated International Code Council (ICC) codes and standards such as the International Building Code (IBC) and International Residential Code (IRC), as well as updated National Fire Protection Association (NFPA) codes and standards. The North Dakota State Building Code, once adopted at the state level, will be available for use by all North Dakota communities in the development, adoption, and enforcement of local codes and standards.*
- **Objective 3.2:** *Advance flood resiliency efforts by encouraging jurisdictions and homeowners to participate in the National Flood Insurance Program.*
- **Objective 3.3:** *Reduce the number of severe repetitive loss and repetitive loss properties in North Dakota throughout the life of the plan.*
- **Objective 3.4:** *Conduct an analysis of critical infrastructure sectors against the state's threats and hazards; develop resiliency strategies to safeguard, protect systems and critical facilities during disasters.*
- **Objective 3.5:** *Collaborate with partners to conduct a losses-avoided study to have actionable data to quantify the damages prevented from hazard events due to the implementation of past mitigation projects.*
- **Objective 3.6**: *Improve resilience to electromagnetic pulse and geomagnetic disturbances from space weather and electromagnetic pulse (EMP) impacts by identifying ways to warehouse and stockpile electrical materials and equipment on a regional basis and acquiring and maintaining a large-format mobile substation for emergency deployment by 2027.*
- **Objective 3.7:** *Identify opportunities for risk reduction by strategizing long-term actions designed to lessen the potential failure of medium and high hazard dams and the cascading consequences.*
- **Objective 3.8:** *Reduce transportation incidents for roadway, rail, and aviation.*

Goal 4: Support a multi-sectoral mitigation approach from natural and technological hazards, and adversarial threats equitably through enhanced application of grant funding.

- **Objective 4.1:** *Continuously prioritize grant funding to align with ranking of hazards and threats based upon the findings in the 2024 Enhanced Mitigation Plan.*

- **Objective 4.2:** *Continue to expand outreach to potential grant applicants and provide resources where possible to guide the process, with availability for technical assistance, as opportunities arise.*
- **Objective 4.3:** *Host yearly cross functional training opportunities to improve grant application quality to promote competitiveness for grant funding within and outside of Hazard Mitigation Assistance (HMA) grants.*
- **Objective 4.4:** *Continue to participate in the Program Administered by State programmatic requirements and expand upon activities as needed.*
- **Objective 4.5**: *Continually work with emergency managers to promote community-wide grant eligibility to target underserved populations.*

Goal 5: Incorporate nature based and climate adaptation solutions into cost-effective, environmentally sound, and feasible mitigation projects and actions.

- **Objective 5.1:** *Collaborate with state agencies, private organizations, tribal groups, and non-profits to promote climate variability education, awareness and inspire action at events or presentations.*
- **Objective 5.2:** *Restore destabilized environments with native vegetation and other research-based solutions to promote adaptability.*
- **Objective 5.3:** *Improve natural resource quality, i.e., water, soil, and air, through nature-based activities and green infrastructure.*
- **Objective 5.4:** *Implement sustainable planning, design, environmental management, and engineering practices that weave natural features or processes into the built environment to promote adaptation and resilience.*

6.1.2.1 Short-term Goals and Objectives

Short-term goals and objectives focus on what can be enacted within the first year and continued throughout the life of the plan, such as elevating hazard mitigation and expanding public education. Short-term goals, because of their ability to be accomplished in a shorter time span, revitalize the team and restore energy and commitment to mitigation. Short-term goals can often serve as a buy-in for long-term goals for elected officials and stakeholders as they are able to measure success in a relatively short time frame. This early realization of benefits provides an opportunity for investment in long-term goals.

6.1.2.2 Long-term Goals and Objectives

The state's long-term goals and objectives focus on capabilities to integrate planning efforts, apply studies and technologies, and build more resiliently with a focus on structural, natural systems, and environmental projects. Additionally, the state remains focused on the mitigation of repetitive loss and severe repetitive loss properties as a continual, long-term strategy. The long-term goals and objectives enhance the legacy of the NDDES program.

6.2 Mitigation Progress

6.2.1 Mitigation Planning Program

6.2.1.1 State-Managed Plan Review Process

Program Administration by State (PAS) is a program that was established following Superstorm Sandy to create a more streamlined approval process allowing communities to get hazard mitigation funds faster. PAS was authorized by the Sandy Recovery Improvement Act of 2013. Under PAS, the Federal Emergency Management Agency (FEMA) can delegate one or a combination of the following activities and subtasks to States and federally recognized tribes: application review, Benefit-Cost Analysis review, grant management, fiscal management, and/or mitigation planning.

The NDDES program has had PAS status for local mitigation planning for five years, meaning NDDES can approve local or tribal hazard mitigation plans. FEMA has delegated its traditional responsibilities to the NDDES program through a formal operational agreement that specifies the State's responsibilities. The State then performs local mitigation plan reviews and determines if the plan can proceed as approved pending adoption (APA), or if the plan needs to be returned to the local jurisdiction to have revisions made on areas of the plan that do not meet the requirements as set in 44 CFR § 201.

FEMA maintains oversight and reviews NDDES's PAS status. FEMA will perform audits on plans that NDDES has approved for quality assurance and will perform co-reviews of plans to ensure ongoing training and compliance for the NDDES mitigation planning staff. Overall, FEMA will remain a supportive resource monitoring NDDES actions and provides tools and training as needed to ensure ongoing PAS status success for NDDES.

6.2.1.2 Local/Tribal Mitigation Progress

Locally, NDDES oversees 53 county, two city, and four tribal hazard mitigation plans, with the Sisseton Wahpeton Oyate Tribe opting to work directly with the South Dakota Office of Emergency Management on their hazard mitigation plan development. Since 2019, NDDES has successfully supported all local jurisdictions in having an approved and adopted local hazard mitigation plan.

When a local jurisdiction is ready to submit their hazard mitigation plan, NDDES requires a completed FEMA Plan Review tool to accompany the plan submission. NDDES pledges to review the local plan and have a determination made within 45 business days of submission from the local jurisdiction; however, the mitigation planning team has an impressive record of better supporting local jurisdictions by completing this review in a shorter timeframe. Comprehensive and extensive feedback is provided from NDDES regardless of the determination of the plan as Approved Pending Adoption (APA) or returned for required revisions.

6.2.1.3 Capability and Capacity Building

NDDES has established a strong and consistent local and tribal mitigation plan program that systematically ensures local jurisdictions have an active and approved plan in place and are engaged in the planning process with sufficient time to prevent a lapse in their plan's coverage. NDDES seeks to further develop their local hazard mitigation planning and their commitment is reflected by their revised mitigation goal number one, which states ***"Elevate hazard mitigation planning for state, local, and tribal jurisdictions."***

Plans continuously have room for further development and improvement. Local Hazard Mitigation Planning Policy Guidance received significant updates with the release of FP 206-21-0002 in April of 2022 (taking effect in April 2023). Local and Tribal jurisdictions, as they engage in their next plan updates, will have the new standards to meet, and additionally can strive to further enhance their plan with integration of climate change data and impacts, availability of new information on emerging hazards (such as space weather), can improve digital tracking (such as updating improvements to mapping and GIS with the latest and ever improving technology capabilities) and can continue to integrate with other updated or new plans, such as other local land use or capital improvement plans.

NDDES works diligently to support the jurisdictions statewide with their local and tribal mitigation programs to capitalize on their strengths and increase their abilities to enhance their programs. Currently, NDDES staff provides the following services and trainings to support local jurisdictions:

- Offers annual G318 Mitigation Planning Workshop that includes state specific examples and presentations from partners such as the State Historical Society, Fire Marshal's Office, and the Department of Water Resources.
- Offers annual IS-235 Emergency Planning Course, which includes discussion on the importance of planning in all phases of emergency management, including mitigation planning. This course highlights the six-step planning process along with factors that should be included when selecting a planning team, research consideration, and how to write an actionable plan.
- Offers Introduction to NDDES courses twice a year highlighting mitigation planning and Hazard Mitigation Assistance during the planning portion of the course. Planning staff present on the process that many jurisdictions take to initiate the mitigation planning and move toward approval.
- Coordinates with local and tribal partners to host Community Coffees to elicit feedback from underserved populations and other sectors of the community whose voices may not have previously been represented in mitigation planning.
- Attends local and tribal mitigation planning meetings virtually or in-person if time allows. Planners field questions throughout the meeting in order to supplement local efforts and build efficiency.

- Organizes regularly scheduled Plan Developers meetings for emergency managers, private plan developers, SHMT Team, and NDDES Staff. These presentations highlight new trends, changes, and other educational opportunities that assist in mitigation planning. Plan Developers meetings also offer the opportunity to promote available grants from partners.
- Developed a Hazard Mitigation Toolbox as a resource for local, tribal, and state planning teams. The toolbox is posted on NDDES's website and is readily available.
- Promotes involvement of local and tribal emergency managers through public outreach by identifying potential underserved populations to be engaged. Local and tribal emergency managers also engage with state and federal initiatives to provide perspectives such as the Grand Forks emergency manager who joined a panel discussion on planning resources during one of the Main Street Summits.
- Conducts one-on-one meetings before, during, and as the mitigation planning process concludes for approval of the plan.
- Hosts guest reviewers from other state agencies such as the ND Department of Agriculture and ND Geological Survey.
- Initiated and maintains a publication, Mitigation Matters, which is shared through NDDES Insights newsletter that works to educate NDDES stakeholders on grant opportunities, mitigation projects, and key mitigation planning elements.
- Works with internal strategic communication staff to disseminate public press releases containing pertinent information relating to mitigation through multiple media platforms.
- Aligns closely with local and tribal emergency managers in an effort to create strong working relationships based on trust. These relationships often create a welcoming space for plan developers to ask questions or find needed information for building resilience.

NDDES has specifically focused on correlating mitigation efforts by hiring a staff member solely to engage directly on climate change and the effects in the state. The building of the climate change program intention is to link directly with local and tribal jurisdictions and underserved communities to provide additional resources for handling and adapting to long-term effects of climate change.

6.2.2 Mitigation Project Development

6.2.2.1 Criteria for Funding Priorities

Hazard mitigation projects administered by NDDES require all projects proposed for funding (including state agency projects) meet the following requirements:

1. Adhere to Hazard Mitigation Assistance (HMA) grant eligibility criteria.

2. Propose a long-term solution to an identified state, local and/or Tribal hazard profiled in a hazard mitigation plan.
3. Solve a repetitive problem.
4. Be technically feasible.
5. Demonstrate cost-effectiveness.
6. Comply with environmental regulations.

NDDES prioritizes projects that directly protect critical facilities and infrastructure as well as projects that are further supplemented with nature base solutions. Further, NDDES matches projects to the most optimal grant funding source to for an increased likelihood in successfully receiving funding; even when NDDES is approached with projects that are not HMA grant eligible they ensure connections are made to the proper agency points of contact to promote interagency collaboration. NDDES is the lead agency for all HMA grant programs. **Figure 6.1** highlights other funding sources and their collaborating lead agencies. Many projects eligible for funding, while not exclusively mitigation, support reduction of the effects of damaging events.

Figure 6.1: Grant Programs Administered by State Agencies

Program	Lead Agency
FEMA HMA (HMGP, HMGP Post-Fire, BRIC, FMA)	NDDES
RiskMAP	NDDWR
National Fire Plan Program	NDFS
Living Snow Fence Program	NDFS, NDDOT
Hazardous Materials Emergency Preparedness Program	NDDES

Each program has its own set of eligibility criteria, and the Mitigation Strategy speaks specifically on FEMA HMA programs. Some of FEMA's grants are annual, competitive grants (BRIC and FMA) while the others (HMGP and HMGP Post-Fire) are activated following a Presidential Disaster Declaration. Regarding implementation and project development, annual funding allows NDDES to operate on a relatively set, routine schedule of actively promoting upcoming mitigation funding, providing training and technical assistance, and encouraging communities to proactively be developing mitigation subapplications. Post disaster funding requires the NDDES team to pivot and activate messaging about the funding opportunity, provide public briefings, describe the subapplication submission process and deadline, and activate the SHMT.

6.2.2.2 State-Managed Project Review Process

NDDES's process for receiving and reviewing subapplications for HMA funding is reviewed and established in the current approved Hazard Mitigation Administrative Plan. NDDES is not a PAS

for application review; however, NDDES does utilize a PAS Pilot Program which allows a condensed application package to be submitted to FEMA for review for HMGP and HMGP Post-Fire Grants (BRIC and FMA are subject to the national committee reviews).

Generally, the NDDES teams systematically reviews subapplications in the following steps:

1. Verification of subapplicant's eligibility.
2. Verification that the proposed project aligns with state and local or tribal mitigation goals and objectives.
3. Analyze and review cost effectiveness (the Benefit-Cost Analysis)
4. Ensure the project is designed to offer a long-term solution to solve a problem to reduce injuries, loss of life, and reduce damage or destruction of property (particularly to critical facilitates, and state or local government facilities or provider sites).
5. Complete the project summary.
6. Complete an Eligibility and Completeness Checklist.
7. Complete an Environmental and Historic Preservation Checklist.
8. Submit the summary packet to FEMA for federal review.

As mentioned, BRIC and FMA are annual awards, and nationally competitive. Subapplications that are submitted to those grants are subject to the national review committee processes. HMGP and HMGP Post-Fire grants are presented to the SHMT. The team, whose purpose is to provide an objective prioritization of subapplications, consists of representatives from the Departments of Water Resources, Health and Human Services, Department of Transportation, and the State Historical Preservation Office.

NDDES is self-sufficient in the administrative data entry of subapplications and applications; while the direction of HMA is to eventually have all grant management functionality within FEMA GO, migration of HMGP and HMGP-Post Fire has not occurred as of the publication of this plan update. NDDES will continue to use NEMIS, as they have successfully been doing, until the merger to FEMA GO is complete. Should North Dakota receive congressionally earmarked PDM funds, which to date is still utilizing the eGrants portal, NDDES will also self-enter subapplication information.

6.2.2.3 Cost-Share and Scoping Assistance

Hazard Mitigation Assistance grants typically have a federal cost share for 75 percent of eligible activity costs. However, certain circumstances within the different grants, such as a community being an Economically Disadvantaged Rural Community or scoring 0.5 or greater on the Center for Disease Control and Prevention (CDC) Social Vulnerability Index (SVI), can redistribute the federal cost share. Please see **Figure 6.2** for the full range of grant cost share circumstances.

Figure 6.2: HMA Cost Share Requirements

Program	Mitigation Award Activity (percent of federal/non-federal cost share)
Hazard Mitigation Grant Program	75/25
Hazard Mitigation Grant Program Post Fire	75/25
Building Resilient Infrastructure and Communities	75/25
Building Resilient Infrastructure and Communities Economically Disadvantaged Rural Communities	up to 90/10
Flood Mitigation Assistance Localized Flood Risk Reduction, Project Scoping, individual mitigation of insured properties, and planning grants	75/25
Flood Mitigation Assistance Socially Vulnerable Communities with a Center's for Disease Control and Prevention (CDC) Social Vulnerability Index (SVI) of 0.5 or greater	up to 90/10
Flood Mitigation Assistance – Repetitive Loss Property	90/10
Flood Mitigation Assistance – Severe Repetitive Loss Property	100/0
Safeguarding Tomorrow RLF	90/10

Emergency Services in the state of North Dakota is governed by Chapter 37-17.1 EMERGENCY SERVICES and must be cited as the North Dakota Disaster Act of 1985. 37-17.1-27 is specific to the State disaster relief fund, which can be a source utilized to supplement the 25 percent local match required for subapplicants. 37-17.1-27 reads:

37-17.1-27. State disaster relief fund - Creation - Uses.
There is created in the state treasury a state disaster relief fund. Moneys in the fund are to be used subject to legislative appropriations for providing the required state share of funding for expenses and administration associated with federal emergency management agency disaster response, recovery, and mitigation grants and for the purposes of reimbursing costs under section 37-17.1-28. Any interest or other fund earnings must be deposited in the fund. Before any expenditure is made from the fund, the agency authorized to make the expenditure shall provide information on the purpose and payee of the expenditure to the appropriation committees of the house of representatives and senate or to the budget section if the legislative assembly is not in session.

The financial infrastructure of the State Disaster Relief Fund demonstrates the state's proactiveness and readiness to have the financial capability to respond to the hazards North Dakota faces, support the recovery needs of North Dakotans, and invest in long term mitigation. North Dakota saves $6.54 per $1.00 invested in mitigation, which has translated to $1,873,393,750.26 in total savings to date (PEW, 2018).

6.2.2.4 Repetitive and Severe Repetitive Loss

Repetitive Loss (RL) and Severe Repetitive Loss (SRL) designations are given to properties that are the most vulnerable and have submitted the most claims in terms of quantity and dollar amounts. These designations are given by the National Flood Insurance Program (NFIP) which is managed by FEMA and is delivered to the public by a network of more than 50 insurance companies and the NFIP Direct (FEMA, 2023). Because properties identified as RL and SRL are the most vulnerable, therefore it can be expected they will continue to submit future claims, they receive the highest priority to mitigate. As shown above in **Figure 6.2**, within the in the FMA grant, RL properties that are being mitigated receive an increased federal cost share of 90 percent and SRL properties that are being mitigated receive an increased federal cost share of 100 percent.

NDDES has created two specific objectives to build resilience pertaining to the RL and SRL properties within the state. The objectives include Objective 3.2: Advance flood resiliency efforts by encouraging jurisdictions and homeowners to participate in the National Flood Insurance Program and Objective 3.3: Reduce the number of severe repetitive loss and repetitive loss properties in North Dakota throughout the life of the plan.

6.2.2.5 State-Managed Monitoring and Closeout

Routine monitoring of mitigation projects ensures the approved scope of work is completed within the allocated budget and within the period of performance, which collectively results in project success. NDDES has several methods to monitor mitigation projects to ensure success and administratively closeout the subaward.

While NDDES does not require a project kickoff coordination call with subapplicants at the time of receipt of a subaward, they do respond to the needs of each subapplicant based on their prior experience, project management capacity, and as requested. Additionally, NDDES's contracts explicitly highlight the project timeline, reporting requirements, administrative procedures for documenting and requesting reimbursements, include the Record of Environmental Consideration requirements, and explain grant subapplication closeout requirements. NDDES firmly establishes their subapplicants for project success from the onset of their project.

Quarterly progress reports are one such method, which are comprehensive summaries and discussed in greater detail in section 6.2.2.8.

Site visits are another method NDDES uses to monitor projects. While one site visit is required before a project can be closed, NDDES has a standard practice of also visiting a project location prior to having any construction begin. A final site inspection is required for project closeout.

Closeout is the completion of a grant's life cycle and signifies the official end of the government's relationship (the grantor, or FEMA) with the non-federal entity (the subapplicant). FEMA declarations and federal awards issued on or after November 12, 2020, are subject to major revisions to the federal closeout rules found at 2 C.F.R. § 200.344 (FEMA, 2023). These revisions include changes to the federal closeout standards, which govern how federal award recipients and subrecipients must close out a federal award.

Subrecipients must submit closeout reports to the pass-through entity (NDDES) no later than 90 calendar days, or an earlier agreed upon date, after the end of the period of performance, and recipients (NDDES) must submit all financial, performance, and other reports as required by the terms and conditions of the award no later than 120 calendar days after the end of the period of performance. Previously recipients also had to submit their documentation within 90 days; the revisions granted recipients an additional 30 working days to complete these tasks. The State completes HMA projects within established performance periods; as of the 2017 PAS application, all grant closeouts have been submitted within 90 days of the end of the period of performance.

6.2.2.6 Grant Requirement Compliance

Adhering to the timeframes and deadlines as set forth by the Code of Federal Regulation (CFR) and FEMA's policies is one of several metrics that demonstrates meeting grant compliance. NDDES routinely meets deadlines for things like submitting quarterly progress reports and financial reports, updating the hazard mitigation administrative plan, and the State Enhanced Mitigation Mission Area Operations Plan. For disasters declared after April 1, 2013, State Administration Plans have been submitted to FEMA for approval within 90 days of declaration dates; since 2018, 100 percent of all PAS applications have been submitted for review and approval by FEMA designated deadline dates, all applications were considered complete and

approvable by FEMA, and any projects that took longer than 90 days for approval were delayed by internal FEMA Region VIII processes. While rare, when the occasion does occur that an extension is needed, the formal request is delivered to FEMA with generous time; any required grant application extensions have been submitted more than 60 days in advance.

In standard situations, NDDES must maintain complete federal award closeout record files for at least three years from the submission date of its final expenditure report. Atypical examples that can extend the three-year requirement include audits, litigation, equipment, or real property being used beyond the period of performance, or other extraordinary circumstances to be assessed on a case-by-case basis. NDDES strictly adheres to this compliance requirement by utilizing the digital grant management software, CIVIX. NDDES also stresses to each subapplicant to also have a record retention policy in place that will meet this compliance requirement.

Acquisitions are the sole mitigation project that requires ongoing compliance checks and site visits even after grant closeout. This is due to the land-use restrictions that are placed on acquired parcels per 44 CFR § 80. NDDES and subrecipients must jointly monitor and inspect acquired parcels (properties) at a minimum of every three years. NDDES is a leading example of a state program that supports local jurisdictions using acquisitions to manage the floodplain while creating qualitative community benefits.

Dating back to 1997, approximately 350 homes were acquired in Grand Forks. That property is now a wonderful amenity, the Greater Grand Forks Greenway. The momentum and dedication to this effective mitigation action continues today, with a FEMA press release dated January 20, 2023, announcing nearly $1.5 million in HMGP funds to the City of West Fargo for the acquisition purchase of at-risk properties along the Sheyenne River (FEMA, 2023).

Overall, North Dakota has more than 800 recorded acquisitions statewide that require ongoing deed restriction and site compliance checks to ensure the parcels are used only for greenspace for perpetuity. Strong partnerships with local floodplain managers make NDDES successful in fulfilling this grant compliance requirement.

6.2.2.7 Environmental Review and Benefit-Cost Analysis

Environmental and Historic Preservation (EHP) refers to FEMA's review process for ensuring the protection and enhancement of environmental, historic, and cultural resources, as required by Federal environmental and historic preservation laws and Executive Orders (E.O.). The EHP review process ensures HMA program and grant compliance with 44 C.F.R. Parts 9, Floodplain Management and the Protection of Wetlands and Part 10, Environmental Considerations, and with all applicable EHP laws, such as the National Environmental Policy Act (NEPA), the National Historic Preservation Act (NHPA), the Endangered Species Act (ESA), and their implementing regulations. The EHP review process also ensures HMA program and grant compliance with E.O. 11988 (Floodplain Management), E.O. 11990 (Protection of Wetlands) and E.O. 12898 (Environmental Justice).

EHP considerations may require identifying alternate project types and/or locations and, as necessary, modifying the project. Two key considerations are whether the proposed project is located in an area that has endangered or threatened species or critical habitat and whether the proposed project might impact historic or cultural resources. If the project could result in adverse impacts to those resources, it might be necessary to change the scope of the project to avoid those impacts or to incorporate mitigation measures to minimize the impacts to those resources.

As a federal agency, FEMA is required to consider the effects of its actions on the environment and historic properties to ensure that all activities and programs funded by FEMA comply with Federal EHP regulations, laws, and Executive Orders. The EHP review process must be completed before funds are released to carry out the proposed project; otherwise, FEMA may not be able to fund the project.

As the recipient of FEMA grant funds, NDDES plays a critical role in ensuring project subapplications have properly assessed their EHP impacts and have performed all necessary steps at the local level prior to submitting a subapplication to FEMA for review and funding consideration. This includes requiring subapplicants to engage in project plan discussion with all applicable local regulatory agencies prior to subapplication submittal with intended project designs and plans and requiring extensive subapplication supporting documentation to include details of potential ground disturbance, potential impacts the project may have on historical resources, endangered and threatened species, high quality labeled maps, charts, project drawings and other schematics or renderings, and overall any other regulatory concerns. NDDES requires the formal responses from the regulatory agencies to be included as part of the subapplication that will be submitted to FEMA. Additionally, NDDES offers EHP focused training periodically to partner agencies and promotes awareness for incorporation and overlap of EHP when opportunities arise, such as conference presentations.

A benefit-cost analysis (BCA) is a systematic process for identifying, quantifying, and comparing expected benefits and costs of an investment, action, or policy. Used in hazard mitigation, the BCA is a method that determines the future risk reduction benefits of a project and compares those benefits to its costs. The result of performing a BCA is the creation of a Benefit-Cost Ratio (BCR), which is determined by dividing the benefits of a proposed project (meaning damages being avoided) to its cost to implement. A hazard mitigation project is considered cost-effective when the BCR is 1.0 or greater, meaning the project's benefits outweigh the project's cost

FEMA has a universal and standardized toolkit that all subapplicants and applicants must use (unless special permission is granted via a formal request) when evaluating hazard mitigation projects. This tool is available for free to ensure equal access for all subapplicants and applicants. As the recipient of FEMA grant funds, NDDES meticulously screens every subapplication to ensure the FEMA BCA toolkit was utilized, valid documentation was the source, and that a logical and feasible process was followed.

A positive BCR (> 1.0) does not necessarily guarantee that a hazard mitigation project will be approved; however, by applying project specific information, the mitigation potentials associated with that project become evident. The results of this analysis can also help communities evaluate current and future mitigation projects and adjust their overall mitigation strategy accordingly.

In the past 20 quarters since North Dakota has attained PAS status, 100 percent of project BCAs were completed within 60 days and approved within 90 days. Moreover, staff members managing BCA analyses have completed the E-276 Introduction to Benefit-Cost Analysis, E-212 Unified Hazard Mitigation Assistance: Application Development and have ten years of experience completing BCA reviews for HMGP projects.

6.2.2.8 Quarterly Progress and Financial Reports

Quarterly progress reports serve as an informative opportunity for subapplicants to relay to NDDES as well as FEMA the current and most critical actions occurring on the project. A well written quarterly progress report should instill confidence in all stakeholders that a project can be completed as the scope was intended and approved, within the period of performance, and with the funds allocated.

Subrecipients partnering with NDDES are required to submit quarterly progress reports to FEMA Region VIII within 30 calendar days after the end of each federal fiscal quarter (12/31, 3/31, 6/30, and 9/30) following the initial award and thereafter until the project has been completed. This includes periods where no activity may have occurred, such as times the project may be waiting to receive a permit, for example. At a minimum, a quarterly progress report must include the following project details: the FEMA assigned project identification number, the subrecipient's name, the project type identified by the standard coding system, percentage of work complete, status of work schedule, anticipated work completion date, status of project cost, and a concise summary of the significant activities and developments that have occurred during the quarter being reported. Phased projects and specific project types may have additional quarterly progress report metrics.

NDDES does not have any additional state required metrics for their quarterly report. NDDES ensures project progress; the communication of such information is passed on through quarterly reports and regular conference calls with FEMA Region VIII. 100 percent of state progress reports are submitted in advance of the deadline. North Dakota continues to be committed to maintaining this record of submission.

Financial reports are unique in that only recipients, or the state, are required to submit them. In other words, subapplicants are not required to submit the quarterly Federal Financial Report (FFR), or SF-425. Similar to a quarterly progress report, an SF-425 is required to be reported even during quarters of no activity. The final SF-425 is due 120 calendar days after the end date

of the period of performance, and NDDES has routinely submitted this report on time. Timely SF-270 request for advance or reimbursement or request to de-obligate funds are completed and submitted, when needed. The State has not had any late drawdowns, and all actual expenditures have been consistent with form SF-424A. Additionally, the State has had no major findings for their past audit at the time of this plan's development.

6.2.2.9 Project Completion Requirements

The HMGP Administration Plan describes the process used to monitor mitigation project completions and closeouts funded by FEMA. Projects must be completed and reconciled within four years of the disaster application deadline, though the state is allowed to request two additional one-year extensions if additional time is required for projects to be completed and costs reconciled. For project completions, the subrecipient shall submit a letter with all final project documentation and a final inspection report to NDDES requesting closeout.

Once a project is completed, NDDES completes the required paperwork to close out individual projects and eventually the disaster or program. The State Hazard Mitigation Officer (SHMO), mitigation staff, and financial officer are responsible for reviewing all paperwork for completion and determining that all eligible work was completed within the performance period. If a project will not be completed within the performance period, NDDES works with the subrecipient to request a 90-day extension prior to the end of the performance period and subsequently encourages project completion. Projects are then monitored for future losses mitigated.

Project completion is referred to as the "100 percent work completion" rule. This means subrecipients (or the local jurisdiction that received HMA funds) must report 100 percent work completion to the recipient (NDDES) when all work associated with the approved scope of work is complete which includes meeting all compliance requirements. This includes activities such as all environmental, code and permit certifications or obtaining insurance for examples. The 100 percent work completion does not include, however, associated grant administrative activities required for closeout such as submitting payments of claims to the recipient (NDDES) or participating in site inspections.

Diligence and collaboration within the wider NDDES team is required and met at every step of a grant funding opportunity, from notification of funding availability to community outreach and technical assistance, to timely, compliant submissions. Proper oversight and management of projects ensures the mitigation program consistently complies with the Financial Management Standard requirement as described in 2 CFR §§ 200.300 to 200.309 which are:

- 2 CFR §§ 200.300**:** Statutory and National Policy Requirements.
- 2 CFR §§ 200.301: Performance Measurement.
- 2 CFR §§ 200.302: Financial Management.

- 2 CFR §§ 200.303: Internal Controls.
- 2 CFR §§ 200.304: Bonds
- 2 CFR §§ 200.305: Federal Payment.
- 2 CFR §§ 200.306: Cost Sharing or Matching.
- 2 CFR §§ 200.307: Program Income.
- 2 CFR §§ 200.308: Revisions of Budget and Program Plans.
- 2 CFR §§ 200.309: Modifications to Period of Performance.

As described in sections above, NDDES fulfills these requirements by complying with all federal requirements, submitting progress reports on time, and engaging in performance reviews (which will be discussed in Section 7) and engaging in a supportive, collaborative, working relationship with FEMA Region VIII (the Federal awarding agency). For example, NDDES programmatic materials have been used by the region as examples for other states and NDDES staff have supported the region on planning training and webinars for audiences outside of ND. NDDES has a transparent and tight fiscal control that fiercely safeguards personally identifiable and otherwise sensitive information of subapplicants and the mitigation program. NDDES had no major findings for their past audit at the time of this plan development. NDDES validates local match prior to subaward, is thorough in the review of all financial invoices, proof of payments, request for reimbursements, and validated actual expenditures are documented and consistent with the SF-424 financial forms (A or C). Additionally, NDDES ensures duplication of benefits is avoided and program income (if applicable) is reported and properly accounted for. Any necessary modifications to scope, budget, or schedule (period of performance) are communicated to the FEMA Region VIII team and the request for extensions and changes are submitted well in advance of the minimum time requirement and always with full supporting documentation.

6.2.3 Progress on Previous Strategies

6.2.3.1 2018 Mitigation Actions

Under the leadership and guidance of NDDES, annually the SHMT and multiple state agencies review and assess their statewide collective progress made towards implementing the state's mitigation actions. This is collected and compiled each year into a report, with the cumulative efforts of calendar years 2019 through 2023 being attached as Appendix F. Annually this report defines the mitigation program and progressive nature of the state as they create an integrated effort statewide to avoid the loss of life and property as well as to reduce spending on recurring events.

Together, NDDES and the SHMT use the annual report to evaluate the effectiveness and efficiency of the mitigation program. These results either validate the mitigation strategy as is, or determine if any revisions are needed to the goals and objectives. Additionally, the results and insight gained from the annual review can allow for resources to be redirected, if needed, to better achieve mitigation actions.

6.2.4 Losses Avoided

Losses avoided can be determined by performing a Loss Avoidance Study (LAS), which is used to quantify the damages prevented from a hazard event as a result of the implementation of hazard mitigation projects. The results of a LAS provide valuable information and insight on what mitigation actions are giving the greatest return on investment and can help guide programmatic prioritization of future mitigation goals, objectives, and actions. NDDES has conducted prior loss avoidance analyses, however, the program understands the immense value that updated LAS data would provide.

Since Oct 2019, ND DWR investments in flood protection and conveyance projects, with total costs of $200,000 or more, are expected to accrue over a 50-year life of each project $361 million in benefits. These include all benefits not just avoided structural damages. If the losses avoided are assumed to be uniformly accrued over time, which is not always the case but is convenient for gross representation and should be caveated as such, the avoided losses average $7.2 million per year. This does not include the major flood control projects that were exempted from the initiating legislation and subsequent policy. From a FEMA reporting perspective ND investment in avoided losses is significant compared to other states resource allocations for similar mitigative strategies. Additional information on loss avoidance can be found in Section 5, Capability Assessment, Figure 5.16. In total, funding between 2018 and 2019 in the HMGP and Pre-Disaster Mitigation program resulted in $53,151,604.30 in losses avoided at a cost of $34,012,496.70 in combined federal, state, and local funding. Benefits for the same projects total $87,164,101.00,

The commitment to conducting a loss avoidance study is reflected by the creation of the new Mitigation Objective 3.5 under Goal 3 of improving disaster resilience to current and future buildings, structures, and infrastructure systems. The objective is to “Collaborate with partners to conduct a losses avoided study to have actionable data to quantify the damages prevented from hazard events due to the implementation of past mitigation projects.” Successful completion of this objective will demonstrate fiscal benefits associated with mitigation, support sound decision making related to public funding, provide insight to the state and local communities to further identify effective mitigation activities, further enhance NDDES’s mitigation strategy, and overall increase the state’s resilience to natural hazards.

6.3 2023 Mitigation Action Plan (Short and Long Term)

6.3.1 Short-Term Actions

The SHMT met to review goals and objectives, before convening in smaller hazard-specific groups to use their expertise and the developed information about risks and consequences of identified hazards to develop short-term mitigation actions that could be developed and enacted in the next five years. This formal planning process involved identified stakeholders

across the state and included not just other state agents, but local stakeholders and non-profit partners concerned about the specific hazards identified through the planning process.

Stakeholders were often able to identify actions that were either in development, easily accomplished, or that needed minimal additional assistance to be enacted. These actions are identified among the mitigation actions as short-term actions. Often the resources and lead agents identified are engaging in implementation of these actions or planning to engage promptly in implementation.

6.3.2 Long-Term Actions

In the same working session, the SHMT also developed long-term mitigation actions, which are those that either need additional assistance to enable enaction or additional time beyond the five-year plan period.

Stakeholders were often able to identify long-term goals that may better protect people and property in the state, but that may require policy change, additional study, or identification of additional resources to enact. These actions are identified among the mitigation actions as long-term actions. Often the lead agents identified may not have the action identified among their priorities or the resources may not be ideally tailored to the action identified, requiring more engagement prior to implementation.

6.3.3 Mitigation Action Identification and Prioritization Methodology

Factors that are considered when determining prioritization include the following: overall project cost, the benefit-cost ratio, technical feasibility, population impacted, project impact area, priority risk index score of the hazard being addressed, if the project protects from multiple hazards, if the project protects multiple Community Lifelines, if nature base solutions are included with the project, and confidence of the project management team. Projects that are specific to flood reduction also evaluate the number of NFIP insured structures that would see risk reduction benefits.

An additional review and prioritization tool is the STAPLEE Evaluation Criteria. STAPLEE represents social, technical, administrative, political, legal, economic, and environmental factors. Reviewing potential mitigation projects under these seven criteria is generally accepted across all ten FEMA regions.

Social: The social criteria evaluates if the public will support the mitigation action, which is measured in terms of community acceptance.

Technical: The technical criteria evaluates if the mitigation action is feasible, will reduce losses for the long-term, and has minimal secondary impacts. Overall, this is evaluating the mitigation action is a whole solution, not just a partial solution (or not even a real solution at all).

Administrative: The administrative criteria evaluate the anticipated staffing, funding, and maintenance requirements for the mitigation action to determine not only if the local jurisdiction has the personnel and administrative capabilities and capacities to implement the mitigation action, but also has the capabilities to maintain the completed project long-term or if outside assistance will be necessary.

Political: The political criteria evaluate the level of political support for the mitigation action.

Legal: The legal criteria evaluates whether the local jurisdiction has the legal authority to implement the mitigation action(s), or if the local jurisdiction must pass new laws or regulations prior to implementation of the mitigation action(s).

Economic: The economic criteria evaluates both the present and future economic impacts of the mitigation action(s) and the return on investment. This includes for the local jurisdiction the funding source of meeting the local match requirement; mitigation action(s) that can be funded in current or upcoming budget cycles are more likely to be implemented than action(s) requiring general obligation bonds or other instruments that will incur long-term debt.

Environmental: The environmental criteria evaluate present and future environmental impacts of the mitigation action(s). Mitigations action(s) must be compliant with statutory regulations (NEPA) but also morally support sustainable and nature base mitigation action(s).

Together, reviewing mitigation projects by the subapplication components, by the project's alignment with the state's hazards priority and THIRA, and using the STAPLEE Evaluation Criteria, NDDES can confidentially prioritize subapplications to mitigation actions. Using these systems ensures proper stewardship of taxpayer dollars and the priority to the most impactful mitigation actions.

6.3.4 2023-2028 Mitigation Actions

NDDES, the SHMT, and the various hazard committee members, after having two dedicated hazard specific meetings, contributing to the drafting of their respective hazard profiles, partaking in the review process, and engaging in one collaborative working session, developed the following mitigation actions to be included in the 2023 plan update.

Mitigation actions were written to be specific yet flexible and adaptable. Actions were targeted to address specific hazards, while some actions when implemented will produce benefits for multiple hazards. Additionally, mitigation actions align with the plan's revised goals and objectives.

For accountability, a lead agency is assigned to each mitigation action. The lead agency can be viewed as the agency that will take primary responsibility and leadership for ensuring the action gets started or accomplished but will have support from other agencies that have vested

interest in the mitigation action. Mitigation actions are assigned either a high, medium, or low priority and an implementation goal year and status of being either a short- or long-term goal. Short term goals are those than can be completed within one to three years, while long term goals are those that require more than three years to reach attainment.

In addition to new goals, there are several goals that were not yet completed from the 2019 plan, but are still valuable, valid mitigation actions that the collective team supports investing ongoing effort and resources. These goals are listed as deferred because as the definition of deferred implies, the action was simply delayed in getting implemented during the last plan cycle. Thus, the action has been carried over for implementation during this plan period.

Action #	Action	Hazard	Goal/ Objective	Priority	Agency	Funding Source	Implementation Goal, Short or Long Term	Status as of 2024
Planning and Regulatory Mitigation Actions								
PR-1	Streamline carbon capture permitting to incentivize industry to sequester greenhouse gas emissions so North Dakota achieves carbon neutrality by 2030	Hazardous Materials	Goal 5 Objective 5.4	High	NDDEQ, NDDMR (Lead)	Climate Pollution Reduction Grant	2030, Long Term	New
PR-2	Evaluate and promote local jurisdictions to adopt landscape ordinances and water conservation ordinances to improve water quality and conserve natural resources	Drought	Goal 5, Objectives 5.1, 5.3, 5.4	High	NCRS (Lead), NDDES	HMGP, BRIC	2028, Long Term	
PR-3	Enforce compliance with new dam design standards as part of the permitting process	Dam Failure	Goal 3 Objective 3.7	High	DWR (Lead), NRCS, BIA	NRCS Rehabilitation Funding, DWR Budget	2026, Short Term	New

Action #	Action	Hazard	Goal/ Objective	Priority	Agency	Funding Source	Implementation Goal, Short or Long Term	Status as of 2024
PR-4	Update hazard classification of existing dams to align with new classification policy	Dam Failure	Goal 3 Objective 3.7	High	DWR (Lead), NRCS, BIA	NRCS Budget (staffing), DWR Budget (staffing)	2026, Short Term	New
PR-5	Continue to implement Safety Corridors to decrease accidents in areas with a high history of accidents	Transportation, Severe Winter Weather, Geologic Hazard, Hazardous Materials	Goal 3, Objective 3.8	High	NDDOT (Lead), NDHP	FHWA	2024, Short Term	New
PR-6	Reduce unsignalized at grade crossings in the state by 20 per year	Transportation Hazards, Hazardous Materials	Goal 3, Objective 3.8	High	NDDOT (Lead)	FHWA, NDDOT Budget	2024, Short Term	New
PR-7	Update all 13 currently outdated Community Wildfire Protection Plans	Wildfire	Goal 1, Objective 1.1	High	NDFS (Lead)	USFA	2026, Short Term	New
PR-8	Engage partners to update data that is used by the environmental justice screening and assessment	All Hazards	Goal 2, Objective 2.1, 2.3, 2.5 and Goal 5,	High	NDDES (Lead), NDDEQ, NDDOT	EPA	2025, Short Term	New

Action #	Action	Hazard	Goal/ Objective	Priority	Agency	Funding Source	Implementation Goal, Short or Long Term	Status as of 2024
	tool, so the tool is more accurate and applicable		Objective 5.1					
PR-9	Provide technical and financial assistance to local and tribal jurisdictions developing or updating MHMPs and assist communities with other mitigation-planning related initiatives	All Hazards	Goal 1, Objective 1.3	High	NDDES (Lead) NDFS, DWR, NDDA, NDSFM, NDSU Extension	HMGP, BRIC, FMA, USFS, BLM, DOI	2028, Long Term	Deferred Ongoing effort to ensure all local and tribal HMPs remain valid with no lapse in coverage. This action to remain in place.
PR-10	Identify and enact GIS improvements or data creation to leverage information as made available from external partners in the most efficient means possible for the end goals of desktop and web-based GIS products for analysis and	All Hazards	Goal 2, Objective 2.1 and 2.4	High	NDDES (Lead) NDIT, DWR, NDDOT, NDSFM, NDHHS, NDDA, NDFS, NDDMR	HMGP, BRIC, State Funds (NDGS Budget), USGS funded FEDMAP, STATEMAP, EDMAP	2026, Short Term	Deferred Multiple agencies have made progress in developing GIS capabilities and data viewing, downloading, availability, and streaming, however the

Action #	Action	Hazard	Goal/ Objective	Priority	Agency	Funding Source	Implementation Goal, Short or Long Term	Status as of 2024
	common operational decision making							complete and final product is not yet finished.
PR-11	In accordance with the NDGS long range geologic mapping plan, the NDGS will complete the detailed geologic mapping of the remaining 25 - 7.5' quadrangles that cover Cass County	Geological Hazards	Goal 2, Objective 2.1	High (was a Low priority in the last plan update)	NDGS (Lead), NDIT	NDGS Budget	2028, Long Term	Deferred NDGS will continue to enhance urban surface geology mapping and hazard mapping (particularly unstable soils in the Red River Valley) and make all available through multiple platforms. As NDGS increases its knowledge base in this area and strives to assure knowledge is

Action #	Action	Hazard	Goal/ Objective	Priority	Agency	Funding Source	Implementation Goal, Short or Long Term	Status as of 2024
								adopted by local, state, and tribal decision-makers.
PR-12	Promote the Firewise and Community Wildfire and Protection Program	Fire (Wildfire)	Goal 2, Objectives 2.1, 2.2, and 2.4	High	NDFS (Lead), NDSFM, BIA	NDFS Budget, USFS grant	2024, Short Term	Deferred Ongoing effort by continuing local fire department engagement. This action to remain in place.
PR-13	Enact basin wide hydrologic studies to understand flood extent and to educate communities on risk; and to develop a strategy for potential mitigation activities	Flood	Goal 5, Objectives 5.2 and 5.3	Medium	DWR (Lead), USACE	Community Assistance Program-State Support Services Element (CAP-SSSE), RiskMAP, DWR General Funds, HMGP,	2028, Long Term	New

Action #	Action	Hazard	Goal/ Objective	Priority	Agency	Funding Source	Implementation Goal, Short or Long Term	Status as of 2024
						BRIC, FMA, USACE		
PR-14	Review regulations/permit conditions for addressing secondary or tertiary effects of increased climate variability	Hazardous Materials	Goal 3, Objective 3.4	Medium	NDDEQ (Lead), NDNG, NDPSC	EPA Grants, DEQ Budget	2028, Long Term	New
PR-15	Develop Repetitive Loss and Severe Repetitive Loss management strategy document	Flood	Goal 3, Objective 3.3	Medium	NDDES (Lead), DWR	HMGP, BRIC, FMA	2024, Short Term	New
PR-16	Evaluate and promote local and tribal jurisdictions to adopt regulatory setbacks or other alternatives to reduce the risk of property loss in high-hazard areas	Geological Hazards, Flood, Fire	Goal 3, Objective 3.1	Medium	NDDES, NDDOC (Co-Leads)	HMGP, BRIC	2028, Long Term	New
PR-17	Develop a digital toolbox with updated NDDES Drought Resource	Drought	Goal 1, Objective 1.1; Goal 2,	Medium	NDDES and NDSU Extension (Co-Leads), Farm Service	USDA	2024, Short Term	New

Action #	Action	Hazard	Goal/ Objective	Priority	Agency	Funding Source	Implementation Goal, Short or Long Term	Status as of 2024
	Guides to assist local and tribal partners with drought planning, management, and informational resources		Objective 2.1		Agency, NDDA, ND Forest Service, DWR, NDHHS, NRCS, USFS			
PR-18	Develop siting guidance and education materials for critical infrastructure; with the goal of educating infrastructure developers to consider hazardous material release impacts	Hazardous Materials	Goal 1, Objective 1.1, and Goal 2, Objective 2.1	Medium	NDDES (Lead), NDDOT, NDNG	EPA	2026, Short Term	New
PR-19	Form a committee to study how mitigation projects enacted by SHMT partners have resulted in losses avoided	Flood	Goal 3, Objective 3.5	Medium	NDDES (Lead) BND, DWR, NDDOT, NRCS, USACE, NDGS, USGS, EDA, USBOR, NDNG, NDDMR, JSND	HMGP, BRIC, FMA	2027, Long Term	Deferred

Action #	Action	Hazard	Goal/ Objective	Priority	Agency	Funding Source	Implementation Goal, Short or Long Term	Status as of 2024
PR-20	Integrate mitigation plans with comprehensive plans, climate action plans, drought mitigation, and other resiliency initiatives (Note this was previously listed as: *Promote integration of mitigation comprehensive plans*)	All Hazards	Goal 1, Objectives 1.1, 1.2, 1.3	Medium	NDDES (Lead) NDDoC	HMGP, BRIC	2028, Long Term	Deferred Ongoing effort by offering interagency training, tabletop discussions, workshops, and exercise opportunities statewide. This action to remain in place.
PR-21	Foster greater participation of cultural and historical preservation organization in the planning process	All Hazards	Goal 1, Objectives 1.1, 1.3	Medium	NDDES (Lead) SHSND, NDSU Extension, NDPR	National Parks, DOI. SHSND Budget	2024, Short Term	Deferred Ongoing effort by collaborating with partners on projects, trainings, and the creation of educational materials. This action to

Action #	Action	Hazard	Goal/ Objective	Priority	Agency	Funding Source	Implementation Goal, Short or Long Term	Status as of 2024
								remain in place.
PR-22	Advocate federal partners to review and update data sources (flood maps) that are cited in federal regulations	Flood, Hazardous Materials	Goal 2, Objective 2.1 and Goal 3, Objective 3.4	Low	NDDOT (Lead), NDDES	EPA, FMA	2027, Long Term	New
PR-23	Develop or acquire systems to integrate climate impact data with surveillance data on new and emerging plant, animal, and human diseases	Infectious Disease	Goal 1, Objective 1.2	Low	NDDA (Lead)	USDA	2028, Long Term	New
PR-24	Conduct outreach with local and tribal zoning and planning boards and commissions to encourage development of master and/or comprehensive plans	All Hazards	Goal 1, Objective 1.1	Low	NDDoC (Lead) NDSFM, NDDES, DWR	NDDoC Budget, HMGP, BRIC	2028, Long Term	Deferred Ongoing effort by meeting with local fire departments and fire chiefs, emergency managers, city and county planning staff,

Action #	Action	Hazard	Goal/ Objective	Priority	Agency	Funding Source	Implementation Goal, Short or Long Term	Status as of 2024
								legislators, and local elected officials and discussing the importance of zoning and master planning. This action to remain in place.
PR-25	Advance the adoption of building codes and zoning ordinances develop and update building codes and zoning ordinances through outreach with local and tribal zoning and planning boards and commissions	Flood, Fire (Wildfire, Urban Fire), Drought, Severe Summer Storms, Winter Storms, Dam Failure	Goal 3, Objective 3.1,3.7	Low	NDDoC (Lead), NDDES	HMGP, BRIC, ND Department of Commerce general fund (staff time)	2028, Long Term	Deferred Ongoing effort by presenting to different audiences at a variety of meetings and conferences across the state. This action to remain in place.
PR-26	Review EAPs to ensure these plans address actions to	Dam Failure	Goal 3, Objective 3.7	Low	DWR (Lead), USBOR, USACE,	DWR Cost Share	2024, Short Term	Deferred

Action #	Action	Hazard	Goal/ Objective	Priority	Agency	Funding Source	Implementation Goal, Short or Long Term	Status as of 2024
	reduce the potential consequences of dam failure				NRCS, BIA	Program, HHPD		
Structural and Infrastructure Mitigation Actions								
SI-1	Promote electrical infrastructure resilience by expanding cybersecurity methods and installing back-up generators and other redundancies	Cyber Attack	Goal 3, Objective 3.4, Goal 4, Objectives 4.1, 4.2, 4.3, and 4.5	High	NDDES (Lead), NDSLIC, SEB	CSIS	2028, Long Term	New
SI-2	Rehabilitate aging dams that do not meet current dam safety criteria	Dam Failure	Goal 3, Objective 3.7	High	DWR (Lead)	HHPD, NRCS, BIA, BRIC, HMGP	2028, Long Term	New
SI-3	Provide technical assistance to private dam owners to rehabilitate aging dams	Dam Failure	Goal 3, Objective 3.7	High	DWR (Lead)	DWR General Fund (staffing)	2028, Long Term	New
SI-4	Upgrade infrastructure to modernize and improve water quality and supply, and to reduce the	Drought, Flood	Goal 3, Objective 3.4	High	DWR (Lead), ND Rural Water	EPA, DEQ Clean Water Revolving Fund, DEQ Drinking Water	2028, Long Term	New

Action #	Action	Hazard	Goal/ Objective	Priority	Agency	Funding Source	Implementation Goal, Short or Long Term	Status as of 2024
	affects from increased flooding and drought					Revolving Fund, BRIC, HMGP, FMA, Climate Pollution Reduction Grant		
SI-5	Construct new or upgrade existing water delivery systems to improve efficiency and conservation (such as breaks caused by ground shifting)	Drought	Goal 3, Objective 3.4	High	DWR (Lead)	ICDBG, DEQ Clean Water Revolving Fund, DEQ Drinking Water Revolving Fund, HMA, Climate Pollution Reduction Grant	2028, Long Term	New
SI-6	Encourage redundancies within power systems by assisting subapplicants to develop applications under HMGP and BRIC	All Hazards	Goal 3, Objective 3.3, Goal 4, Objectives 4.1, 4.2, 4.3, and 4.5	High	NDDES (Lead) NDaRECs, NDSLIC, USDHS, NDDES-SR	HMGP, BRIC	2028, Long Term	Deferred

Action #	Action	Hazard	Goal/ Objective	Priority	Agency	Funding Source	Implementation Goal, Short or Long Term	Status as of 2024
SI-7	Assist subapplicants with application development of flood proofing projects to protect critical facilities, utility infrastructure, government buildings, and residential structures	Flood	Goal 3, Objectives 3.3 and 3.4, Goal 4, Objectives 4.1, 4.2, 4.3, and 4.5	High	NDDES (Lead)	HMGP, BRIC, FMA, STORM, NDDES General Budget, EMPG	2028, Long Term	Deferred
SI-8	Assist subapplicants with application development of tornado safe room and shelter projects	Severe Summer Storms	Goal 3, Objective 3.4 and Goal 4, Objectives 4.1, 4.2, 4.3, and 4.5	High	NDDES (Lead)	HMGP, BRIC, NDDES General Budget, EMPG	2028, Long Term	Deferred
SI-9	Convert overhead powerlines to buried underground lines, where appropriate (Note this was previously listed as: *Promote electrical*	Severe Summer Weather, Severe Winter Weather, Space Weather	Goal 3, Objective 3.4	Medium	NDDES (Lead), NDAREC, SEB	HMGP, BRIC, Utility Funding (NDAREC)	2028, Long Term	New

Action #	Action	Hazard	Goal/ Objective	Priority	Agency	Funding Source	Implementation Goal, Short or Long Term	Status as of 2024
	infrastructure mitigation measures)							
SI-10	Assist subapplicants with application development for generators and other redundancies for back-up power sources on critical facilities, water towers, and lift stations	Severe Winter Weather, Severe Summer Weather	Goal 3, Objective 3.4, Goal 4, Objectives 4.1, 4.2, 4.3, and 4.5	Medium	NDDES (Lead)	HMGP, BRIC	2028, Long Term	New
SI-11	Improve transportation infrastructure to reduce accidents and prevent mass casualty and hazardous material release incidents	Hazardous Materials, Severe Winter Storms, Transportation Hazards	Goal 3, Objective 3.8	Medium	NDDOT (Lead) NDSLIC, NDHHS, NDAC, NDDMR, USDHS, NDHP	SAFER grant	2028, Long Term	Deferred
SI-12	Assist subapplicants with application development for installation and	Severe Summer Storms	Goal 3, Objective 3.4 and Goal 4,	Medium	NDDES (Lead)	HMGP	2028, Long Term	Deferred

Action #	Action	Hazard	Goal/ Objective	Priority	Agency	Funding Source	Implementation Goal, Short or Long Term	Status as of 2024
	update of outdoor warning systems		Objectives 4.1, 4.2, 4.3, and 4.5					
SI-13	Construct with permeable paved surfaces to reduce runoff and promote groundwater recharge (also known as water smart landscaping)	Drought	Goal 5, Objective 5.3	Low	NDDOT, NDPR (Co-Leads)	Climate Pollution Reduction Grant, BRIC, HMGP	2028, Long Term	New
SI-14	Work with communities to implement and enforce building codes when retrofitting buildings and critical facilities to withstand wind and weight, and proper water line depth	Severe Winter Weather, Severe Summer Weather	Goal 3, Objective 3.4	Low	NDDOC (Lead)	HMGP, BRIC, CDBG	2028, Long Term	New (Note this was previously listed as: *Retrofit community sites to mitigate risk of threats and hazards*)
SI-15	Explore and identify options for hastening river	Geological Hazards, Flood	Goal 5, Objective 5.4	Low	NDDES (Lead), DWR, NDGS	HMGP, BRIC, USACE	2028, Long Term	New

Action #	Action	Hazard	Goal/ Objective	Priority	Agency	Funding Source	Implementation Goal, Short or Long Term	Status as of 2024
	channel modification where change is imminent in the long-term							
SI-16	Evaluate structural and nonstructural mitigation alternatives for at-risk areas for landslides near waterways	Geological Hazards	Goal 5, Objectives 5.2 and 5.3	Low	NDDES (Lead), DWR, NDGS	HMGP, BRIC	2028, Long Term	New
Nature Based Mitigation								
NB-1	Identify areas of cultural significance at risk from geological hazards	Geological Hazards	Goal 2, Objective 2.3	High	SHSND (Lead), Tribal Agencies, BIA, NDIAC, Tribal Partners	HMGP, BRIC, Tribal Data Development, DOI, BLM, Interpretive Center, University GIS Departments, National Park System	2025, Short Term	New
NB-2	Collaborate with partners to restore rivers and streams	Drought	Goal 5, Objectives 5.1 and 5.2	High	DWR (Lead), NDDES, NDGF, USACE	HMGP, BRIC, EPA	2028, Long Term	New

Action #	Action	Hazard	Goal/ Objective	Priority	Agency	Funding Source	Implementation Goal, Short or Long Term	Status as of 2024
	most vulnerable to drought impacts to increase resiliency for water supply, streamflow, and aquatic habitats							
NB-3	Identify potential areas or communities that may be adversely affected by excessive fuel loading and create partnerships to mitigate wildfire fuel loads	Fire (Wildfire)	Goal 3, Objective 3.4; Goal 5, Objective 5.2	High	NDFS (Lead)	HMGP, BRIC, USFA, HMGP-PF	2025, Short Term	Deferred (Note this was previously listed as: *Mitigate ponderosa pine hazardous fuel mitigation sites; identify and mitigate hazardous fuel sites*)
NB-4	Invest in natural buffers and nature-based solutions to improve water quality	Drought	Goal 5, Objectives 5.1, 5.2, and 5.3	Medium	NDDES (Lead), NRCS, NDGF, DWR	HMGP, BRIC, EPA	2028, Long Term	New
NB-5	Construct infiltration basins as	Drought	Goal 5, Objective 5.3	Medium	NRCS (Lead), NDDES, NDGF	HMGP, BRIC, EPA, CDBG	2028, Long Term	New

Action #	Action	Hazard	Goal/ Objective	Priority	Agency	Funding Source	Implementation Goal, Short or Long Term	Status as of 2024
	an alternative mean of water storage							
NB-6	Support the development of natural and artificial snow fences at the local and tribal levels	Winter Storms	Goal 3, Objective 3.4 and Goal 5, Objectives 5.2 and 5.4	Medium	NDFS (Lead) NDDOT, NDDES	HMGP, BRIC Arbor Day Foundation	2027, Long Term	Deferred Ongoing effort to identify locations and develop natural or artificial snow fences to increase protection for local and tribal jurisdictions from Winter Storms. This action to remain in place.
NB-7	Construct and incorporate raingardens or vegetated swales to reduce storm water runoff	Severe Summer Hazards	Goal 5, Objective 5.3	Low	NRCS (Lead), NDGF	HMGP, BRIC	2028, Long Term	New
NB-8	Invest in community projects including planting and utilizing tree canopies to	Severe Summer Hazards	Goal 5, Objective 5.3	Low	NRCS (Lead), NDGF	HMGP, BRIC, Arbor	2028, Long Term	New

Action #	Action	Hazard	Goal/ Objective	Priority	Agency	Funding Source	Implementation Goal, Short or Long Term	Status as of 2024
	reduce urban heat-island effects					Day Foundation		
Public Education, Technical Assistance, and Partnerships								
PTP -1	Create media literacy kits to educate the public about hazards and reduce the spread of misinformation	Adversarial Threats	Goal 2, Objectives 2.3 and 2.5	High	ND State Library System (Lead), NDDES, SLIC	General Fund, EMPG	2024, Short Term	New
PTP -2	Promote climate literacy kits, amongst other tailored youth and adult hazard information, available via partnership with the ND State Library	Natural Hazards with Climate Change Focus	Goal 2, Objectives 2.1, 2.2, 2.4, and 2.5	High	ND State Library (Lead), NDDES	American Library Association, EMPG	2024, Short Term	New
PTP -3	Develop and conduct mitigation funding trainings to increase (1) awareness of programs and (2) capabilities of local and tribal communities to apply	All Hazards	Goal 2, Objective 2.1	High	NDDES (Lead), NDEMA	HMGP, BRIC, FMA	2026, Short Term	New

Action #	Action	Hazard	Goal/ Objective	Priority	Agency	Funding Source	Implementation Goal, Short or Long Term	Status as of 2024
PTP -4	Disseminate state-developed risk information products to property homeowners, real estate agents, developers, tribes, and public officials so that individuals, tribes, and communities can make decisions about geological hazards	Geological Hazards	Goal 1, Objective 1.2, Goal 2, Objective 2.3	High	NDDES (Lead), NDGS, NDEMA, ND REALTORS	HMGP, BRIC	2025, Short Term	New Data has been developed and promoted by the state about landslide risk and other hazards but is being improved and disseminated.
PTP -5	Train NDDES Staff and Local and Tribal Mitigation Planners on use of Equity Mapping Tools	All Hazards	Goal 1, Objective 1.1; Goal 2, Objective 2.3	High	NDDES (lead), NDEMA, NDIAC	EMPG	2024, Short Term	New
PTP -6	Form coalition or workgroup of public/private sector utility experts and stakeholders in electricity generation/distribution industry to share	Space Weather, Severe Winter Weather, Severe Summer	Goal 3, Objective 3.6	High	NDDES (Lead), NWS, NDIAC, NDDES, NDGS, NDEMA	Commerce, NERC	2026, Short Term	New

Action #	Action	Hazard	Goal/ Objective	Priority	Agency	Funding Source	Implementation Goal, Short or Long Term	Status as of 2024
	resources and mitigation ideas	Weather, Cyberattack						
PTP -7	Form coalition or workgroup of public/private sector utility experts and stakeholders in the pipeline industry to share resources and mitigation ideas	Space Weather, Severe Winter Weather, Severe Summer Weather, Cyberattack	Goal 3, Objective 3.6	High	NDDES (Lead), NWS, NDIAC, NDDES, NDGS, NDEMA	PHMSA	2026, Short Term	New
PTP -8	Identify eligible dams for HHPD grant and apply to fund rehabilitation; and work with emergency managers and dam owners to pursue funding	Dam Failure	Goal 3 Objective3. 7	High	DWR (Lead)	HHPD	2028, Long Term	New
PTP -9	Conduct community flood insurance and flood hazard mitigation forums regarding available programs, resources, and funding sources	Flood	Goal 2, Objective 2.4, Goal 3, Objective 3.2	High	NDDES (Lead)	HMGP, BRIC, FMA	2024, Short Term	New

Action #	Action	Hazard	Goal/ Objective	Priority	Agency	Funding Source	Implementation Goal, Short or Long Term	Status as of 2024
PTP -10	Establish a clear public drought warning system that is easy to understand and emphasizes an ability to give early warnings via ND Mesonet System (NDAWN)	Drought	Goal 2, Objectives 2.1, 2.2, 2.4, and 2.5	High	NWS (Lead), NDDES, NDSU State Climatologist	USDA	2028, Long Term	New
PTP -11	Identify and/or develop and conduct a Whole Community education program that teaches the basics and benefits of gardening, pollinator gardens, native flowers and plants, and home-grown food systems	Drought	Goal 2, Objectives 2.1, 2.2, 2.4, and 2.5; Goal 5, Objectives 5.1, 5.2, 5.3, 5.4	High	NDSU Extension NDGF (Co-Leads), NDDES	DPI, NDSU Extension	2024, Short Term	New
PTP -12	Host outreach activities to encourage homeowners to purchase insurance	Flood, Fire (Wildfire and Urban Fire), Severe Summer Storms	Goal 2, Objectives 2.1, 2.2, 2.5, and 2.5 Goal 3.	High	DWR (Lead), ND Insurance Department	CAP-SSSE, RiskMAP, DWR General Funds,	2024, Short Term	Deferred

Action #	Action	Hazard	Goal/ Objective	Priority	Agency	Funding Source	Implementation Goal, Short or Long Term	Status as of 2024
	(including flood insurance)		Objective 3.2			Insurance Providers		
PTP -13	Increase participation in the NOAA's National Weather Service's StormReady Program	Severe Summer Storms	Goal 2, Objectives 2.1, 2.2, 2.4, and 2.5	High	NWS (Lead) NDDES, NDEMA, NDAIC, City, County, and Tribal Emergency Management Partners	NWS Budget (staff time and signage)	2024, Short Term	Deferred
PTP -14	Provide physical and cyber security measures grant funding to schools and other public entities	Adversarial Threats	Goal 4, Objectives 4.1, 4.5	Medium	NDDES (Lead), NDIT	Homeland Security Grant, State and Local Cyber Security Grant	2024, Short Term	New
PTP -15	Create and promote public Air Quality notification and announcement capabilities and system	Hazardous Materials, Wildfire	Goal 2, Objectives 2.1, 2.2, 2.4, and 2.5	Medium	NDDEQ (Lead)	EPA	2026, Short Term	New
PTP -16	Develop county- and state- and tribal-based landslide information tracking system of active and	Geological Hazards	Goal 1, Objective 1.2, Goal 2, Objective 2.3	Medium	NDDES (Lead), NDGS, NDEMA, NDIAC	HMGP, BRIC, NDGS Budget	2026, Short Term	New

Action #	Action	Hazard	Goal/ Objective	Priority	Agency	Funding Source	Implementation Goal, Short or Long Term	Status as of 2024
	recent landslides to assist with land and water development decision-making							
PTP -17	Conduct outreach with elected officials, neighborhood groups, and homeowner associations about the benefits of maintaining defensible spaces	Wildfire	Goal 2, Objectives 2.1, 2.2, 2.4, and 2.5	Medium	NDFS (Lead), BIA	USFA	2026, Short Term	New
PTP -18	Support educational efforts related to culturally important native plants (tribal/medicinal), food, and animals that are impacted by drought	Drought	Goal 2, Objectives 2.1, 2.2, 2.4, and 2.5	Medium	NDGF and NDSU Extension (Co-Leads), NDDES, NDIAC, NDUS, Tribal Partners	NDSU Extension	2026, Short Term	New
PTP -19	Conduct education and outreach on available programs and financial support to implement	Drought	Goal 2, Objectives 2.1, 2.2, 2.4, and 2.5	Medium	NDDA (Lead)	NDSU Extension, USDA FSA, NRCS, ND Stockmen's Association	2024, Short Term	New

Action #	Action	Hazard	Goal/ Objective	Priority	Agency	Funding Source	Implementation Goal, Short or Long Term	Status as of 2024
	sustainable grazing and agricultural conservation practices							
PTP -20	Provide education on how producers and the public can conduct water testing to ensure safe water quality conditions, especially the testing of nitrates in feed during deteriorating drought environmental conditions	Drought	Goal 2, Objective 2.1	Medium	NDDA (Lead)	USDA, Water Utilities	2024, Short Term	New
PTP -21	Conduct outreach to increase NFIP participation, advance awareness/use of RiskMAP products, and increase CRS scores	Flood	Goal 2, Objectives 2.1, 2.3, 2.4 and 2.5, Goal 3, Objectives 3.2 and 3.3, Goal 4 Objectives 4.1, 4.2,	Medium	DWR (Lead) NDDES, ND Insurance Department	HMGP, BRIC, FMA	2026, Short Term	Deferred

Action #	Action	Hazard	Goal/ Objective	Priority	Agency	Funding Source	Implementation Goal, Short or Long Term	Status as of 2024
			4.3, and 4.5					
PTP -22	Conduct outreach with the livestock industry to understand insurance options	Drought	Goal 2, Objective 2.1	Low	NDDA (Lead), ND Insurance Department	ND Stockmen's Association	2027, Long Term	New
PTP -23	Promote storm safety information during Severe Weather Awareness Weeks	Severe Summer Weather, Severe Winter Weather	Goal 2, Objectives 2.1, 2.2, 2.4, and 2.5	Low	NWS (Lead), NDDES, NDUS, ARC. AARP, MAFB, NDVOAD	NOAA	2024, Short Term	New
PTP -24	Launch a public outreach program targeting both businesses and citizens related to advanced indoor/outdoor water conservation practices	Drought	Goal 2, Objectives 2.1, 2.2, 2.4, and 2.5	Low	DWR	USDA, NRCS, Water Utilities	2026, Short Term	New
PTP -25	Promote public awareness and use of NDDOT resources, which includes travel maps, cameras, and	Severe Winter Weather, Transportation Hazards	Goal 2, Objectives 2.1, 2.2, 2.4, and 2.5	Low	NDDOT (Lead), NDDES, MAFB, AARP, NDUS, NDSU Extension, U-Mary, NDVOAD	SAFER Funds	2026, Short Term	New

Action #	Action	Hazard	Goal/ Objective	Priority	Agency	Funding Source	Implementation Goal, Short or Long Term	Status as of 2024
	an opt-in service that sends condition updates							
PTP -26	Develop web-based Disaster Recovery Planning resources that promotes community resiliency	All Hazards	Goal 1, Objective 1.1	Low	NDDES (Lead)	HMGP, BRIC, EMGP. AAR	2024, Short Term	Deferred While some existing guides have been updated and new guides have been created, the final product is not yet complete.
PTP -27	Promote and educate local jurisdictions on methods to address how population changes and economic considerations, and future development impact exposure to natural hazards.	All Hazards	Goal 2, Objectives 2.1, 2.2, 2.3, 2.4, 2.5	Mediu m	NDDES (Lead)	BRIC, HMGP	2029, Long Term	New – This was an evolving area for local and tribal mitigation planning at the time of approval for the state enhanced plan.

Action #	Action	Hazard	Goal/ Objective	Priority	Agency	Funding Source	Implementation Goal, Short or Long Term	Status as of 2024
PTP -28	Develop strategies and tools that assist local/tribal mitigation programs that specifically address disparities in underserved communities and challenges resulting from the impacts of climate variability.	All Hazards	Goal 2, Objectives 2.1, 2.2, 2.3, 2.4, 2.5	Medium	NDDES (Lead)	BRIC, HMGP	2029, Long Term	New
Other Mission Areas								
OM -1	Maintain multi-agency response to human and animal disease threats	Infectious Disease	Goal 3, Objective 3.4	High	ND Dept of Ag (Lead), NDDES, NDDEQ, NDHHS, NDDOT, NDG&F	USDA, CDC	2024, Short Term	New
OM -2	Create a winter weather information dashboard for a centralized location for decision making	Severe Winter Storms	Goal 2, Objective 2.4	High	NDDES (Lead)	HMGP, NOAA, EMPG	2024, Short Term	New
OM -3	Establish and maintain a robust medical cache with ease of access to resources such as	Infectious Disease	Goal 3, Objective 3.4	High	ND Dept of Ag and NDHHS (Co-Leads)	Hospital and Clinic Funds	2024, Short Term	New

Action #	Action	Hazard	Goal/ Objective	Priority	Agency	Funding Source	Implementation Goal, Short or Long Term	Status as of 2024
	personal protective equipment to mitigate exposure to infectious and harmful agents							
OM -4	Build capacity (rosters, training, equipment) at the local and tribal fire department levels to promote self-sufficiency and reliable Mutual Aid Responses when needed	Wildfire and Urban Fire	Goal 1, Objective 1.3, Goal 2, Objective 2.3, Goal 4 Objectives 4.2 and 4.5	High	NDFS (Lead), BIA,	USFA	2026, Short Term	New
OM -5	Build capacity in small communities that lack snow removal capabilities by increasing equipment inventories, regionalizing snow removal routes and resource sharing, and identifying additional funding	Severe Winter Storms	Goal 1, Objective 1.3, Goal 2, Objective 2.3, Goal 4 Objectives 4.2 and 4.5	High	NDDOT (Lead)	CDBG	2028, Long Term	New

Action #	Action	Hazard	Goal/ Objective	Priority	Agency	Funding Source	Implementation Goal, Short or Long Term	Status as of 2024
	to further boost self sufficiency							
OM -6	Continue to identify Traffic Incident Management (TIM) opportunities and training	Transportation Hazards	Goal 3, Objective 3.8	High	NDDOT (Lead)	FHWA	2024, Short Term	New
OM -7	Improve summary reporting ability from HazConnect database for local users and improved planning purposes	Hazardous Materials	Goal 3, Objective 3.8	High	NDDES (Lead)	EPA	2025, Short Term	New
OM -8	Establish and promote Cyber Security best practice guidelines via Defend.Nd.gov	Cyber Attack	Goal 2, Objective 2.1	High	NDDES (Lead), NDIT, NDNG	NDIT Budget, State and Local Cyber Security Grant	2024, Short Term	New
OM -9	Champion information security and cybersecurity to encourage citizens to increase awareness and knowledge of the issue	Cyber Attack	Goal 2, Objectives 2.1, 2.2, 2.4, and 2.5	High	NDIT (Lead), NDDES, NDNG	NDIT Budget	2024, Short Term	New

Action #	Action	Hazard	Goal/ Objective	Priority	Agency	Funding Source	Implementation Goal, Short or Long Term	Status as of 2024
OM -10	Promote programs that draw awareness to the recognition and prevention of drug use, specifically fentanyl overdose and drug related deaths	Criminal Attack	Goal 2, Objective 2.1	High	NDDES (Lead), BCI, NDSLIC, NDHHS, Local Public Health, Local First Responder groups	DEA, Partnership for a Drug-Free America	2024, Short Term	New
OM -11	Build and enhance collaboration with Canadian and Tribal contacts to facilitate communication, surveillance, and tracking of infectious diseases in order to better inform mitigation measures	Infectious Diseases	Goal 1, Objective 1.2	Medium	NDHHS, NDDA, NDAIC (Co-Leads)	CDC, USDA, Commerce	2028, Long Term	New
OM -12	Evaluate available resources and address resource gaps for healthcare systems and veterinarian services to develop plans and interagency	Infectious Diseases	Goal 1, Objective 1.3 and Goal 2, Objective 2.3	Medium	NDDA (Lead)	USDA	2026, Short Term	New

Action #	Action	Hazard	Goal/ Objective	Priority	Agency	Funding Source	Implementation Goal, Short or Long Term	Status as of 2024
	partnerships to share resources necessary for prevention and mitigation measures							
OM -13	Target two critical infrastructure assessment sectors and host two Critical Infrastructure presentations annually	Criminal Attack	Goal 3, Objective 3.4	Medium	NDDES (Lead), BCI, NDSLIC, Local EM's, Private Industry, NGO's	General Fund, EMPG	2024, Short Term	New
OM -14	Facilitate the discussion and development of a behavioral analysis task force at the local and tribal levels that is supported by state agencies	Nation-State, Terrorists Attacks	Goal 1, Objective 1.3	Medium	NDSLIC (Lead), NDDES, Potential FBI, County/City/Tribal First Responder Groups, NDIAC	DoJ, COPS, ATF	2026, Short Term	New
OM -15	Invest in Intelligent Transportation Systems for Traffic Incident Mitigation which includes cameras, dynamic message systems,	Transportation Hazards	Goal 3, Objective 3.8	Medium	NDDOT (Lead). FHWA	FHWA-PROTECT	2028, Long Term	New

Action #	Action	Hazard	Goal/ Objective	Priority	Agency	Funding Source	Implementation Goal, Short or Long Term	Status as of 2024
	fixed anti-icing spray technology, intersection collision warning systems, curve warning systems, and wrong way detection systems							
OM -16	Support development of local and tribal drought contingency plans and studies with rural and regional water suppliers	Drought	Goal 1, Objective 1.1	Medium	NDDA (Lead), NDDES, NDSU Extension	USBOR WaterSMART, BRIC, HMGP	2028, Long Term	Deferred Education, coordination, support, briefings, reports, and periodic calls were hosted and technical assistance and educational programs were hosted; however final product plans were not developed by regional water suppliers.

Action #	Action	Hazard	Goal/ Objective	Priority	Agency	Funding Source	Implementation Goal, Short or Long Term	Status as of 2024
OM -17	Procure and install secure electronic systems	All Hazards	Goal 3, Objective 3.6	Medium	NDSLIC (Lead) NDDES, NDIT	NDIT Funding Derived from State Agency Budgets	2028, Long Term	Deferred Significant progress has been made to proactively monitor and secure state network traffic including the development of a response plan, however more education, awareness, training, and strengthening of the system will continue. This action to remain in place.
OM -18	Educate and support the Whole Community on ways to mitigate cyber threats affecting	Cyberattack	Goal 1, Objective 1.3, Goal 2, Objectives 2.1, 2.2,	Medium	NDIT (Lead) NDSLIC, NDNG	NDIT Budget, Homeland Security Grant,	2024, Short Term	Deferred Providing public educational

Action #	Action	Hazard	Goal/ Objective	Priority	Agency	Funding Source	Implementation Goal, Short or Long Term	Status as of 2024
	personal, private, and State security and other sensitive information		2.3, 2.4, and 2.5, Goal 4 Objectives 4.3 and 4.5			NDNG Budget		opportunities on the topic of cyber security is an ongoing effort. ND will use free resources created to supplement this effort. This action to remain in place.
OM -19	Enact loss control measures to increase safety and health of workers, first responders, and New Americans	All Hazards	Goal 2, Objectives 2.1, 2.2, 2.4, and 2.5	Mediu m	NDHHS and Dakota WSI (Co-Leads), Job Service North Dakota, NDDHS, RMD, NDDOT, NDDES	WSI Loss Prevention Funds, OSHA, NDDMR	2024, Short Term	Deferred Continued to provide education, screenings, testing, and vaccinations and professional safety services for a variety of groups as well as increased cleaning

Action #	Action	Hazard	Goal/ Objective	Priority	Agency	Funding Source	Implementation Goal, Short or Long Term	Status as of 2024
								frequency at public, state-owned facilities.
OM -20	Promote vaccinating and remove barriers (such as transportation access) for the at-risk population to induce active immunity to a disease and develop herd immunity or slow disease progression	Infectious Disease	Goal 2, Objectives 2.1, 2.2, 2.4, and 2.5	Medium	NDHHS and NDDA (Co-Leads), USAPHIS, North Dakota Stockmen's Association, NDG&F	NDHHS Budget and NDHHS Children's Vaccination Program Funds	2024, Short Term	Deferred
OM -21	Promote training through the Center for Domestic Preparedness to include mobile field force and command, and protester devices trainings offered at local jurisdictions annually	Civil Disturbance	Goal 2, Objective 2.7	Low	NDDES (Lead), NDIT, NDNG	Center for Domestic Preparedness, Participating Agency Budgets	2025, Short Term	New

Action #	Action	Hazard	Goal/ Objective	Priority	Agency	Funding Source	Implementation Goal, Short or Long Term	Status as of 2024
OM -22	Educate homeowners on the benefits of climate smart lawns with drought tolerant native vegetation	Drought	Goal 5, Objectives 5.1, 5.2, 5.3, and 5.4	Low	NDDES, DWR (Co-Leads)	NDSU Extension	2026, Short Term	New
OM -23	Provide speed limit education and information for bulk transporters	Hazardous Materials	Goal 3, Objective 3.8	Low	NDDOT (Lead)	DOT	2025, Short Term	New
OM -24	Assist the private business sector and local and tribal jurisdictions with Continuity of Operations (COOP) planning in preparation of adversarial threats or natural hazards	All Hazards	Goal 1, Objective 1.1	Low	NDDES (Lead), NDSLIC, Chambers of Commerce, Department of Commerce, Law Enforcement Chiefs and Sheriffs, Local Businesses, North Dakota Community Foundation	North Dakota Community Foundation, Local Community Foundations, EMPG	2028, Long Term	New
OM -25	Maintain tree trimming along power lines to prevent power outages	Severe Winter Weather, Severe Summer	Goal 5, Objective 5.2 and 5.3	Low	NDAREC Members	Utility Funding (NDREA)	2024, Short Term	New

Action #	Action	Hazard	Goal/ Objective	Priority	Agency	Funding Source	Implementation Goal, Short or Long Term	Status as of 2024
		Weather, Fire						
	Provide technical information to health care professionals, agronomists, vector control boards, and others regarding the prevention and control of diseases or infestations, including infection prevention	Infectious Disease	Goal 2, Objectives 2.1 and 2.4	Low	NDHHS and NDDA (Co-Leads)	NDHHS, NDDA and NDSU Extension budgets	2024, Short Term	Deferred
OM -26	Provide technical assistance to local and tribal jurisdictions with hazardous materials planning	Hazardous Materials	Goal 1, Objective 1.1	Low	NDDES (Lead)	NDDEQ, HazChem Fund, EPA, NDDMR	2025, Short Term	Deferred
OM -27	Promote and enforce safe handling, storage, and disposal of hazardous materials	Hazardous Materials	Goal 3, Objective 3.4	Low	NDDA (Lead) NDHHS, NDSLIC, NDNG	CERCLA, DEQ Budget, Federal Programs	2024, Short Term	Deferred
2019-2023 Completed and Removed Projects								

Action #	Action	Hazard	Goal/ Objective	Priority	Agency	Funding Source	Implementation Goal, Short or Long Term	Status as of 2024
	Develop a web-based Hazard Mitigation Planning Toolbox	All	Goal 1, Objective 1.1	Medium	NDDES (Lead) SHMT	HMGP, BRIC	Completed in 2022	Completed in 2022
	Analyze operating agreements for the Souris River Dam	Dam Failure	Goal 3, Objective 3.7	Low	DWR (Lead)	DWR Budget, International Joint Commission	Completed in 2022	Completed in 2022
	Identify and implement drought mitigation strategies	Drought	Goal 5, Objective 5.4	Medium	NDDA (Lead) NWS, DWR, NDDOT, NDDCS, NDDES, State Climate Office	HMGP, BRIC	Removed	Removed More specific drought mitigation actions have been created and added to this plan update; thus, this generic action is being removed and replaced. Please see mitigation actions NRP-7, NRP-8, SP-11, SP-12, SP-13

Action #	Action	Hazard	Goal/ Objective	Priority	Agency	Funding Source	Implementation Goal, Short or Long Term	Status as of 2024
								and SP-14 which collectively replace this mitigation action.
	Periodically review dam status, conditions, designs, permitting of new dams; encourage owners to maintain and repair dams	Dam Failure	Goal 3, Objective 3.7	Low	DWR (Lead) BIA, USUSBOR, USACE, NDDMR, NRCS	DWR Budget	Removed	Removed More specific dam failure mitigation actions have been created and added to this plan update; thus, this generic action is being removed and replaced. Please see mitigation actions PR-3, PR-4, PR-26, SI-2, SI-3 and PTP-8 which collectively replace this

Action #	Action	Hazard	Goal/ Objective	Priority	Agency	Funding Source	Implementation Goal, Short or Long Term	Status as of 2024
								mitigation action.
	Enact the systematic collection of the occurrence of disease or disease syndrome	Infectious Disease	Goal 1, Objective 1.1	Medium	NDHHS and NDDA (Co-Leads) USAPHIS	USDA, FEMA COVID-19 Funding	Completed in 2021	Completed in 2021
	Give people or animals who may have been exposed to a disease-causing agent an antibiotic, antifungal, or antiviral medication to prevent illness	Infectious Disease	Goal 3, Objective 3.4	Medium	NDHHS and NDDA (Co-Leads)	USDA, FEMA COVID-19 Funding	Completed in 2021	Completed in 2021
	Separate people, animals, or produce that are ill or are contaminated or that may have been exposed from the general population	Infectious Disease	Goal 3, Objective 3.4	High	NDHHS and NDDA (Co-Leads)	USDA, FEMA COVID-19 Funding	Completed in 2021	Completed in 2021
	Provide community or population-based strategies to reduce events that lead to crowding during an infectious disease	Infectious Disease	Goal 3, Objective 3.4	High	NDHHS and NDDA (Co-Leads)	USDA, FEMA COVID-19 Funding	Completed in 2021	Completed in 2021

Action #	Action	Hazard	Goal/ Objective	Priority	Agency	Funding Source	Implementation Goal, Short or Long Term	Status as of 2024
	outbreak (i.e., social distancing)							
	Remove ill and/or exposed animals or plans through euthanasia or other methods	Infectious Disease	Goal 3, Objective 3.4	Low	NDHHS and NDDA (Co-Leads)	USDA, NDDA Budget	Complete d in 2023	Completed in 2023
	Control plant diseases and infestations by spraying or applying insecticides, fungicides, pesticides, herbicides, or larvicides	Infectious Disease	Goal 3, Objective 3.4	Low	NDHHS and NDDA (Co-Leads) NDGF	USDA, NDDA Budget	Complete d in 2023	Completed in 2023
	Utilize genetic modification to develop hybrid plants that are resistant to common diseases	Infectious Disease	Goal 3, Objective 3.4	Low	NDDA (Lead)	USDA, NDDA Budget	Complete d in 2021	Completed in 2021
	Increase capacity to provide acute and long-term care for people with infectious diseases	Infectious Disease	Goal 3, Objective 3.4	High	NDHHS (Lead)	NDHHS Budget, FEMA COVID-19 Budget	Complete d in 2021	Completed in 2021

Action #	Action	Hazard	Goal/ Objective	Priority	Agency	Funding Source	Implementation Goal, Short or Long Term	Status as of 2024
	Support the development of local and tribal debris management plans	Flood, Fire (Wildfire), Severe Summer Storms	Goal 1, Objective 1.1	High	NDHHS (Lead) NDDES	USDA	Completed, 2023	Completed, 2023 A free, customizable template was created and published to local and tribal communities to use and adapt to their unique debris management needs. Debris Management and Operator Training will continue to be offered on a periodic basis.
	Develop and implement an all-hazard and all-threat public education and outreach program	All	Goal 2, Objectives 2.1, 2.2, 2.3, 2.4, and 2.5	Medium	NDDES (Lead), NWS, USDHS, NDSLIC, NDHHS, NDDA	HMGP, BRIC, EMPG, NDDES Budget, DPI Budget	Completed in 2023	Completed in 2023

Action #	Action	Hazard	Goal/ Objective	Priority	Agency	Funding Source	Implementation Goal, Short or Long Term	Status as of 2024
	Promote electrical infrastructure mitigation measures	All	Goal 3, Objectives 3.3 and 3.6	High	NDDES (Lead) NDaRECs, NDSLIC, USDHS	HMGP, BRIC	2023-2028	Removed. This item has been replaced/updated to be a more accurate mitigation activity and is now listed as Mitigation Activity SI-9.
	Retrofit community sites to mitigate risk of threats and hazards	All	Goal 3, Objective 3.4 and Goal 4, Objectives 4.1, 4.2, 4.3, and 4.5	High	NDDES (Lead), NDDOT, NDITD, NDDES, NDSLIC, USDHS	HMGP, BRIC	2023-2028	Removed This item has been replaced/updated to be a more accurate mitigation activity and is now listed as Mitigation Activity SI-14.

Action #	Action	Hazard	Goal/ Objective	Priority	Agency	Funding Source	Implementation Goal, Short or Long Term	Status as of 2024
	Identify and implement drought mitigation strategies	Drought	Goal 5, Objective 5.4	Medium	NDDA (Lead), NWS, DWR, NDDOT, NDDCS, NDDES, State Climate Office	HMGP, BRIC	Removed	Removed More specific drought mitigation actions have been created and added to this plan update; thus, this generic action is being removed and replaced.
	Procure and implement all-hazards emergency notification systems	All	Goal 2, Objective 2.2 and 2.3	Medium	NDDES (Lead)	HMGP, BRIC	Completed in 2022	Completed in 2022
	Work with Federal, State, local, and tribal agencies to secure additional financial support to improve dams and educate dam owners	Dam Failure	Goal 3, Objective 3.7; Goal 4, Objective 4.2 and 4.3	Low	DWR (Lead), USUSBOR, USACE, BIA, NRCS, NDSLIC, USDHS	DWR Cost Share Program	Completed in 2023	Completed in 2023

6.3.5 Local Prioritization

All the mitigation actions included in the 2023 plan update were crafted with thoughtful insight from a diverse team representing multiple state agencies, the private sector, and nonprofit organizations. While all the actions have value, time, limited resources, and financial constraints do not permit for all actions to be implemented immediately or simultaneously. Therefore, a system of prioritization must be in place to help guide action implementation.

Capability and Capacity Building projects, which include new plan creations and plan updates, planning-related activities, project scoping, technical assistance, partnerships, and codes and standards cannot be compared to the same criteria as regular projects, as they are uniquely different. Capability and Capacity Building activities have the goal to enhance knowledge, skills, and expertise while building community resilience. This is foundational to developing strong mitigation programs and can often be a precursor to the development of regular mitigation projects. Given that a requirement for HMA funding for all applicants and subapplicants is to have a FEMA approved mitigation plan, priority will always be given to jurisdictions that need to update their current hazard mitigation plan.

Figure 6.3 summarizes the number of mitigation actions as they relate to specific hazards. Drought has the greatest amount of specific mitigation actions at 32, while Civil Disturbance, Space Weather, and Terrorist or Nation-State Attacks, all tied for the least amount of specific mitigation actions at 16 each. The other hazards that received the greatest amount of dedicated mitigation actions after drought include Sever Summer Weather Hazards, Severe Winter Weather Hazards, Hazardous Materials, and Flood.

Figure 6.3: 2024 Mitigation Actions by Hazard Frequency

Hazard	Mitigation Action Frequency
Drought	32
Severe Summer Weather	28
Severe Winter Weather	28
Hazardous Materials Release	26
Flood	26
Wildfire/Urban Fire	24
Geologic Hazards	22
Cyber Attack	21
Infectious Disease	21
Dam Failure	20
Transportation Incidents	18
Criminal Attack	17
Civil Disturbance	16
Space Weather	16

Hazard	Mitigation Action Frequency
Terrorist or Nation-State Attacks	16

The actions that NDDES, the SHMT, and the hazard committees created support the state's risk assessment (previously discussed in Section 4). **Figure 6.4** are hazards as ranked highest to lowest based on the updated Priority Risk Index (PRI) which the collective team completed as part of the plan update. Three hazards that have been assigned the greatest number of mitigation actions are also three of the hazards that ranked highest on the new PRI; therefore, regarding local prioritization of mitigation, the team is already successfully committing action to the hazards viewed as the greatest concern.

Figure 6.4: 2024 PRI Hazard Ranking

Hazard	2024 PRI Score
Flood	3.7
Wildfire/Urban Fire	3.5
Drought	3.4
Cyber Attack	3.4
Severe Winter Weather	3.2
Severe Summer Weather	3.1
Infectious Disease	2.9
Dam Failure	2.3
Hazardous Materials Release	2.2
Criminal Attacks	2.2
Space Weather	2.2
Geologic Hazards	1.9
Terrorist or Nation-State Attacks	1.9
Civil Disturbance	1.4
Transportation Incidents	1.3

6.4 Mitigation Strategy Conclusions

North Dakota is home to possibilities as endless as the horizon, and the State Enhanced Mitigation Mission Area Operations Plan and Strategy seeks to protect and reduce vulnerability of the public, property, infrastructure, environment, and economy of communities statewide from impacts of natural and technological hazards as well as adversarial threats. Implementation of the mitigation strategy does not come without challenges, of which the three greatest can be summarized as staffing, funding, and public awareness and support.

Staffing: Partners at the local level, such as local emergency managers and other related positions often fill multiple staffing roles within the community, with only a portion of their time available for mitigation. While they have a desire to create and implement effective mitigation plans and strategies, competing priorities, multiple workloads, and lack of sufficient staff often means they must just focus on getting the minimum required done. Even beyond administrators, many of the emergency and mitigation functions are enacted by volunteers and people who have another primary role, up to and including project development for mitigation programs.

Funding: Lack of local funding paired with the state routinely receiving more applications than available funding for mitigation plans and projects means that local communities are often dependent on competing for funding. The staffing issues mentioned above also inhibit many communities' abilities to implement projects, or even to submit quality mitigation grant applications. While federal funding is a primary source of mitigation funding for many local communities, other barriers make it underutilized.

Public Awareness and Support: Public perceptions about the need for (or lack of need for) certain mitigation strategies and projects can lead to lack of support or outright opposition to mitigation projects. Misinformation and the use of non-reputable sources is problematic, and projects can be delayed or fail because of the public misunderstanding of the risks and costs. North Dakota is a relatively disaster-prone state but does experience significant periods of time between disasters that warrant a Presidential declaration, which makes it difficult to relate the true risks of hazards to residents. Often only after an event has occurred in a specific area, or a change in flood mapping increases flood insurance premiums that communities become amenable to mitigation. The low population density can make obtaining enough damages to reach a successful benefit-cost analysis a challenge, even for projects critical to the population that it impacts. Obtaining non-federal match is also a challenge for small jurisdictions.

NDDES and the SHMT, with the strong collaborative support and representation of multiple state agencies, have been successful in navigating the challenges of implementing mitigation projects. Conducting the hazard mitigation plan update serves an important role in the mitigation process by identifying hazards, prioritizing actions, and identifying funding streams and lead agencies that have the capability of championing certain actions. Plan development gives the state the opportunity to network, prioritize and distribute responsibility across the wider group of engaged stakeholders in reducing the impacts of hazards. It allows a broad audience to define the risk. Through the process of revising goals and objectives and identifying productive mitigation actions that target all 15 hazards that can impact North Dakotans, the planning process serves as an initiating process. The product of the State Enhanced Mitigation Mission Area Operations Plan becomes a tool and a roadmap to a strong mitigation program the reaches beyond NDDES to build resilience and achieve a vision of becoming the most resilient state in the nation.

7 Plan Maintenance

Hazard mitigation planning is a continuous and ongoing process. Policies and procedures established in this plan reflect the current hazard mitigation philosophy at both the state and national level. Changes in hazard mitigation programs and/or priorities, including changes in legislation and available funding, may necessitate modifications to this plan. To facilitate and ensure this plan remains viable for the State of North Dakota for many years, the plan maintenance responsibilities lie with the North Dakota Department of Emergency Services (NDDES) and the State Hazard Mitigation Team (SHMT). These plan maintenance concepts are current to 2023 best practices to better reflect the maintenance process used in recent years. This allows for more manageable maintenance during times of disaster.

The NDDES Planning Section Chief, or designee, coordinates maintenance of the plan, including all monitoring, evaluation, and update activities. As part of the 2023 plan update process, NDDES planners reviewed the strategy detailed in previous plan versions for monitoring, evaluating, and updating the plan and compared it to the plan maintenance activities that occurred since plan adoption. As evidenced by the 2023 North Dakota Hazard Mitigation Annual Progress Report, in Appendix F, NDDES and the SHMT members have modified plan content, particularly the mitigation actions, to best meet the needs of the State. A major focus has been to cultivate integration and partnerships among all state agencies and departments, local and tribal agencies, and public and private partners.

The plan and its appendices are developed, monitored, evaluated, maintained, and revised in accordance with the *Plan Development and Maintenance Policy for Emergency Plans and Procedures* based on guidelines defined in CPG 101 Developing and Maintaining Emergency Operations Plans and the NDDES-HLS Six Step Planning Process. The NDDES Planning Chief, or designee, has responsibility for working with the SHMT for development of plan content.

7.1 Monitoring, Evaluation, and Updating the Plan

7.1.1 Plan Monitoring

The plan will be monitored by the NDDES Planning Section. At a minimum, the plan is reviewed annually, prior to the yearly State-FEMA consultation and after each disaster. Each time the SHMT convenes, the team will review progress toward mitigation goals and completion of mitigation activities. The projects' current statuses and any new project ideas will be discussed. Each SHMT member maintains its own list of projects completed, and these projects are added to the plan during the state plan update process. As part of the monitoring process, NDDES and/or the SHMT will complete the following tasks:

- Review the hazard profiles to determine updates required to data and interpretations constituting the consequence analysis portion of the profiles;
- Review hazard mitigation projects and initiatives to ensure that there are no potential conflicts with ongoing agency initiatives;

- Review hazard mitigation projects and initiatives to ensure that they complement the statewide mitigation strategy; and
- Review existing state and federal programs to ensure that the state takes full advantage of possible funding sources in implementing the state hazard mitigation program.

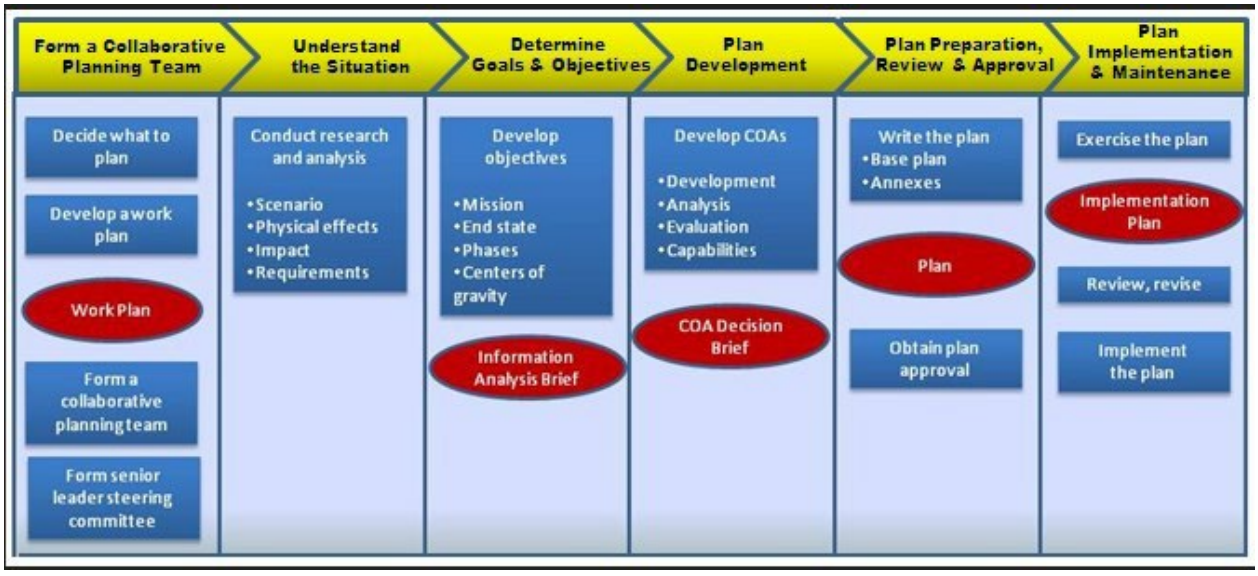
7.1.2 Plan Evaluation

Annually and/or after each disaster, the NDDES Planning Chief, or designee, will initiate an evaluation of the plan within the planning section. Changes to the plan and a more thorough evaluation will be made in the third year of the plan update cycle. A general evaluation of the plan will be conducted as needed by the SHMT. The criteria utilized to evaluate the plan will be obtained from the FEMA Enhanced Plan Review Crosswalk. All disaster or emergency incidents will be evaluated for general/specific mitigation recommendations that should be added to the plan. Methods of implementing and maintaining the plan will be evaluated for successes and improvements. Changes to the implementation schedule or plan maintenance will be made as needed and captured in each update cycle to ensure hazard mitigation activities continue. New stakeholders and interested parties will be identified and invited to participate in the implementation and update process. Should a hazard event have occurred in which a mitigation project was a factor, either positive or negative, a summary report including avoided losses will be written by NDDES planners for incorporation into future updates.

7.1.3 Plan Update Process

The process for updating this plan is not a single-agency effort, but rather a multi-agency, multi-jurisdictional effort that attempts to coordinate and integrate the data, observations, goals, objectives, actions, and capabilities from a wide variety of entities performing or desiring to perform mitigation activities. The plan update process follows the Six-Step Planning Process and generally takes a year or more to be effectively completed. **Figure 7.1** provides a snapshot of the Six Step Planning Process.

Figure 7.1: NDDES Six Step Planning Process



Source: NDDES

Figure 7.2 provides a synopsis of the tasks to be undertaken when updating this plan.

Figure 7.2: Plan Update Task List

Step/Task
1. Planning Chief identifies the Planning Team Leader and Core Planning Team.
2. Planning Team Leader begins tracking communications associated with the plan update.
3. Core Planning Team reviews existing plan and crosswalk and identify needed updates. The Core Planning Team also conducts research and analysis as well as reviews existing plans and events/exercise after action reports.
4. Planning Chief works with the Disaster Recovery Chief to secure any necessary funding sources.
5. If necessary, the Planning Team Leader develops a request for proposals, evaluates proposals, and awards contract(s) in collaboration with the Disaster Recovery Chief. Contractor becomes part of the Core Planning Team.
6. The Core Planning Team begin tracking significant plan changes and develops a concept of operations (CONOPS).
7. The Planning Team Leader reviews the stakeholder contact list, makes necessary changes, and identifies and invites new stakeholders, forming the Collaborative Planning Team (State Hazard Mitigation Team).
8. The Planning Team Leader initiates plan outreach and discussion, including public meetings and schedules a collaborative planning team meeting.
9. The Planning Team Leader assigns collaborative team members to mitigation planning committees.
10. The Collaborative Planning Team considers the addition, removal, or modification of hazards identified in the plan.
11. The Core Planning Team evaluates risk assessment methodologies and data sources.
12. The Collaborative Planning Team evaluates and updates the hazard profiles through the committee structure.
13. The Collaborative Planning Team evaluates and updates the risk assessment summary through the committee structure.
14. The Collaborative Planning Team evaluates and updates the mitigation strategy through the committee structure.
15. The Collaborative Planning Team evaluates and updates the mitigation plan implementation system through the committee structure.
16. The Collaborative Planning Team evaluates and updates the plan maintenance system as needed.
17. The Planning Team Leader working with the Collaborative Planning Team develops the necessary annual mitigation reports.
18. The Core Planning Team integrates new and updated local and tribal mitigation plans and ensures integration of feedback from leadership and stakeholders.
19. The Core Planning Team integrates new and updated related state plans.
20. The Core Planning Team evaluates and updates other plan sections (i.e., table of contents, adoption documentation, introduction, appendices).
21. The Core Planning Team identifies and add any additional sections or information needed.
22. The Planning Chief reviews the updated plan in its entirety.
23. The Planning Team Leader conducts updated plan outreach, including public information, comment periods, and public meetings.
24. The Core Planning Team Integrates additional comments received.
25. The Core Planning Team finalizes the plan document.
26. The Planning Team Leader completes the crosswalk and submits the final plan to FEMA for review and approval.
27. If necessary, the Core Planning Team makes additional modification as required.
28. The Planning Chief obtains signed letter from the Governor adopting the plan.
29. The Planning Team Leader distributes the plan to the Collaborative Planning Team and any other stakeholders through posting to the NDDES website.

7.2 Monitoring Mitigation Progress

7.2.1 System for Reviewing Progress on Achieving Mitigation Strategy Goals

Progress toward achieving this plan's goals will be reviewed annually through the meeting of the SHMT. The NDDES Planning Chief, or designee, has oversight for development of an annual report outlining mitigation progress implementation. As the progress on these recommended actions is tracked, progress on achieving mitigation strategy goals will also be monitored by the NDDES Planning Chief, or designee. If any of the goals are not receiving adequate attention, it will become apparent as the mitigation action table is periodically updated.

7.2.2 System for Reviewing Progress on Implementing Mitigation Strategy Activities and Projects

The procedures for reviewing the progress associated with implementing activities and projects related to the mitigation strategy are contained within Section 6. The SHMT has instituted an annual progress report as a methodology for tracking progress on implementation of strategies as well as evaluation of the applicability of the current risk assessment. Annual review by NDDES and the SHMT will also consider recommendations provided by FEMA through the Enhanced Plan Review Crosswalk.

7.2.3 Plan Updates

As disasters occur, projects are completed, and hazard and threat information are improved, the plan will be updated. The plan will be updated and re-submitted to FEMA for re-approval every five years, as required by law. Updates will be based on the latest available FEMA guidance and incorporate innovative technologies and methods so that the plan is kept current and relevant. The Mitigation Strategy is updated annually and/or post-disaster, while all other sections of the plan are updated every five years. The annual report discusses implementation progress, recent responses to hazards and threats, and partners' success stories.

The plan may also be subject to interim updates if any of the following conditions apply:

- At the request of the Governor;
- When significant new risks or vulnerabilities are identified; or
- If the findings of the annual / post-disaster review and evaluation warrant an update.

The procedures for interim and five-year updates are described below.

7.2.3.1 Updates Resulting from Interim Evaluations

The nature of plan updates will be determined by the evaluation process described above. In general, the NDDES Planning Chief, or designee, will notify the SHMT that the Agency is initiating an interim plan update and describe the circumstances that created the need for the update. The NDDES Planning Chief

will determine if the full SHMT should be consulted regarding the potential changes. If it is determined that the SHMT should be involved, the nature of the involvement will be at the discretion of NDDES. When interim updates are completed, NDDES will advise all SHMT members that the plan has been updated and describe the nature of the update.

7.2.3.2 Updates Related to the Required Five-Year Plan Review

As required by law, the plan will be updated for re-submission and re-approval by FEMA every five years. In those years, the evaluation process will be substantially more rigorous and will examine all aspects of the plan in detail. It is anticipated that several meetings of the SHMT will be required, and that the plan will be formally re-adopted by the State.

At least 30 months prior to the update deadline, NDDES will initiate the plan update process by contacting SHMT members and other appropriate agencies and organizations to determine a schedule and process for updating the plan. Prior to beginning the next plan update, a survey will be distributed to the SHMT as well as local representatives to understand how the previous plan benefited them and the changes that would improve utilization. Feedback from this survey will inform the detailed and structured re-examination of all aspects of the plan, followed by recommended updates. The recommendations will be presented to the SHMT for consideration and approval. Once the plan has been developed and approved by FEMA Region VIII, the Governor formally adopts the plan.

7.2.3.3 Continued Integration and Public Involvement

As part of the plan update process, the SHMT reviews and identifies opportunities for integrating other state plans, planning initiatives, and ongoing mitigation efforts with the MAOP. It is critical that all public stakeholders are given the opportunity to be involved in plan updates to ensure ongoing public involvement. All interim plan updates are made available to the public.

North Dakota continues to demonstrate its commitment to pursuing an equitable approach to mitigation planning through its robust and all-encompassing outreach efforts. The inclusion of historically underserved and vulnerable groups in the planning process is critical to promoting equity and equality across the state. NDDES partners with groups such as the North Dakota Health and Human Services (NDHHS) Health Equity Committee to better identify, engage, and include traditionally underserved populations. These groups include, but are not limited to, veterans, senior citizens, tribal members, new Americans, and LGBTQ2S+. Together, NDDES and the NDHHS Health Equity Committee work to alleviate inequities in public health related to economic, social, and environmental disparities through the implementation of strategies based in advocacy and collaboration. One example of this inclusive and collaborative approach is NDDES' recent meetings with the North Dakota Center for Persons with Disabilities (NDCPD) at Minot State University. Through presentations on threats and hazards in North Dakota, emergency management staff created an opportunity to listen to the concerns and recommendations from attendees representing NDCPD.

In addition to involving groups who are traditionally underrepresented in the planning process, NDDES promotes an elevated level of involvement with the public through the facilitation of its Community Coffee program, an ongoing series of public touchpoints around the state aimed at gathering local and tribal input from groups ranging from farmers and ranchers to the people experiencing homelessness

and their advocates. By coordinating these sessions with organizations such as the North Dakota State University Extension, 4-H Youth Development, Minot State University Center for Persons with Disabilities, NDHHS health advisory board, oil and gas industry groups, and more, NDDES ensures that a diversity of voices across the state are routinely involved in the planning process.

These efforts are also reflected in the state's Strategic Plan with objectives that support equity to foster a diverse, inclusive, and equitable workforce, stakeholder groups, and volunteer base.

7.3 Enhanced Planning Requirements

Since North Dakota has achieved enhanced status for the mitigation plan, the state must meet both the standard requirements and the enhanced level requirements. The state's successes in meeting the enhanced planning requirements are outlined below.

7.3.1 HMA Management Program Requirement

Enhanced states receive an additional 5 percent in HMGP funds after a disaster and share the responsibility for reducing risk across state agencies and departments. To be enhanced, a state must demonstrate they submit timely, accurate, and complete HMA grant applications, reports and analyses.

7.3.1.1 Performance Review

The North Dakota Hazard Mitigation Grant Program Administrative Plan, quarterly reporting system, and HMGP applications have all been used as models for other states. In addition, FEMA Headquarters has used the standard HMGP acquisition application and quarterly reports developed by North Dakota as the National Emergency Management Information System (NEMIS) standard.

During the application process, since North Dakota has been approved for all delegated authorities available through the Program Administered by State (PAS) Pilot Program, NDDES provides FEMA with project summaries and any documentation required for environmental/historic preservation review. Additional documentation for all projects is available at the request of FEMA. NDDES submits all HMGP applications electronically through NEMIS. NDDES also assists local governments with the cost share and ensures the matching funds are committed prior to the application being awarded. Once awarded, a unique individual file is created for each mitigation project, containing the relevant information regarding the project. Information about the project is entered into NEMIS or the NDDES grants management system. Each project also has its own accounting sheet that is linked to a summary sheet for each disaster/grant program. These sheets are also linked to FEMA's Smartlink account used for drawdowns.

7.3.2 Plan Integration

Enhanced states must show a history of working across agencies and stakeholder groups to become more resilient by bringing partners together, aligning goals and strategies, and leveraging action for greater resilience. Based on NDDES' Strategic Plan, an overarching objective outlined by the state is to

utilize mitigation planning to collect information that may be woven into other elements of planning. This is evident with a focus on plan integration within the mitigation strategy (See Section 6) tying state and local partners together with actions that require the cooperation of multiple departments or organizations. By fostering projects that are multi-agency, the momentum of integration is maintained even after the plan has been adopted and encourages continued efforts among the various groups.

7.3.3 Comprehensive Mitigation

North Dakota is committed to a comprehensive mitigation program as evidenced through the state's efforts to address hazards at the state, regional, tribal, and local levels. All levels of government participate in supporting and funding mitigation measures. The mitigation strategies presented in Section 6 of the MAOP are the framework for the state's mitigation program. These strategies include new and continued commitments to interagency cooperation, as each mitigation action is assigned a lead agency (or co-leads) to implement and monitor progress on the activities. There is ongoing support for local hazard mitigation planning efforts as well as state-led hazard mitigation initiatives that address the range of hazards present in the state.

North Dakota has created strong interagency partnerships within the state government that work together to promote mitigation goals and objectives across its communities. One example of this interagency cooperation can be found in Section 7 of the MAOP, specifically related to Mitigation Goal 2: *Enhance and expand public education and understanding of natural hazard risks and vulnerabilities within a changing climate, and the importance of developing effective mitigation and adaptation solutions within the whole community.* NDDES partners with Floodplain Management staff from North Dakota Department of Water Resources (NDDWR) to assist in outreach and promotion of educational course offerings in floodplain management and basic insurance certification programs. These courses and programs are offered in multiple languages to ensure a broad and equitable reach. NDDES also supports widespread outreach related to the National Flood Insurance Program (NFIP) to educate owners of at-risk properties and make them aware of insurance opportunities both through NFIP and private alternatives. Additionally, Emergency Management staff coordinates with the Governor's office to execute strategically targeted flood insurance and hazard mitigation awareness campaigns to deliver public education and awareness information in an effort to reach a greater number of North Dakota's residents.

7.3.4 Goal Attainment

Tracking goals and measuring accomplishments is a key aspect of hazard mitigation planning. One of the more visible ways North Dakota accomplishes this is through the release of Hazard Mitigation Annual Progress Reports. Annual progress reports are a vehicle for NDDES to compile various pieces of information highlighting why mitigation matters to the state in addition to providing up-to-date developments on ongoing mitigation efforts and status updates on specific mitigation actions. The 2023 Annual Progress Report contains sections covering how the state is addressing climate variability by outlining climate literacy and education initiatives in addition to providing concise informational excerpts on how climate change is guiding mitigation goals and objectives. In addition to this valuable information, subsequent sections of the annual report provide updates and details on the major ongoing

mitigation projects such as the University of Mary Slope Stabilization, the ND Resilient Infrastructure Project, and the City of Fargo Wastewater Treatment Plant Flood Protection Plan. The report also includes information on specific HMGP funding sources currently being leveraged to complete these actions in addition to announcements of current funding opportunities for new projects. The concluding section of each annual report contains detailed citations of mitigation actions from the previous MAOP with highlighted updates to reflect on-the-ground changes and the addition of new actions since the last plan update. By compiling and releasing annual reports, NDDES ensures that the MAOP is a living document that is frequently updated and relevant.

7.3.5 Implementation

The annual report allows NDDES to reflect on identified actions and report on progress of identified actions to the public. The process of developing the annual report is also beneficial. Its development provides an opportunity for hazard mitigation staff to reflect on the next steps to fully implement the plan, set new priorities, and engage with other partners to determine where untapped resources may be available to fully implement the MAOP. In this way, the implementation of the plan and reporting on its progress helps identify new pathways to attaining all priorities in the plan. The plan is a living document that requires this annual process for full implementation. The process helps to encourage continued engagement across the Whole Community to obtain its goals.

FEMA's Federal Insurance and Mitigation Administration (FIMA) has granted North Dakota Program Administration by States (PAS) status, allowing the state to utilize a more streamlined grant approval process.

7.3.6 Plan Implementation Evaluation

The Enhanced Mitigation Mission Area Operations Plan will be developed, evaluated, maintained, and revised in accordance with the *Plan Development and Maintenance Policy for Emergency Management Plans and Procedures* in coordination with lead and support agencies and organizations. Guidelines defined in CPG 101 Developing and Maintaining Emergency Operations Plan and the NDDES-HLS Six Step Planning Process are reflected in this policy. The Enhanced Mitigation Mission Area Operations Plan and its supporting documents will be updated in accordance with the Plan Development and Maintenance Schedule outlined in the Response Mission Area Operations Plan (MAOP).

7.3.7 Record of Changes

Date	Summary of Changes
April 2024	Grammatical changes; correction of misinformation; clarification regarding terrorist events, extremist events, and criminal activity; citing references; deleted extraneous information; added more ND specific examples; additional data elements addressed.

A. Acronyms and Terminology

A.1 Acronyms

A.2 Terminology

A.1 Acronyms

100-year Flood: A flood with a 1 percent or greater chance of occurring each year.
ACS: American Community Survey
ADL: Anti-Defamation League
AML: Abandoned Mine Lands
AMS: American Meteorological Society
APHIS: Animal and Plant Health Inspection Service
ASDSO: Association of State Dam Safety Officials
ASOS: Automated Surface Observing System
ATSDR: Agency for Toxic Substances and Disease Registry
BNSF: Burlington Northern Santa Fe
BRIC: Building Resilient Infrastructure and Communities
CAFO: Concentrated Animal Feeding Operations
CDBG: Community Development Block Grant
CDC: Centers for Disease Control and Prevention
CDC SVI: Centers for Disease Control and Prevention Social Vulnerability Index
CEJST: Climate and Environmental Justice Screening Tool
CFR: Code of Federal Regulations
CISA: Cybersecurity and Infrastructure Security Agency
CME: Coronal Mass Ejection
CMI: Crop Moisture Index
CMIP: Computer Model Intercomparison Project
CRP: Conservation Reserve Program
CRS: Community Rating System
CSIS: Center for Strategic and International Studies
CWD: Chronic Wasting Disease
DAPL: Dakota Access Pipeline
DCN: Dakota Carrier Network
DHS: Department of Homeland Security
DIR: Drought Impact Reporter
DMA 2000: Disaster Mitigation Act of 2000
DPI: Department of Public Instruction
DRF: Disaster Relief Fund
DRI: Drought Reconnaissance Index
EIONET: European Environment Information and Observation Network
EPA: Environmental Protection Agency
FBI: Federal Bureau of Investigation
FEMA: Federal Emergency Management Agency
FIRM: Flood Insurance Rate Map
FIS: Flood Insurance Studies
FMA: Flood Mitigation Assistance
FMAG: Fire Management Assistance Grant
FRSAN: Farm and Ranch Stress Assistance Network
EAP: Emergency Action Plan
EHD: Epizootic Hemorrhagic Disease
FRA: Federal Railroad Administration

FTO: Foreign Terrorist Organization
GIC: Geomagnetic Induced Current
GCR: Galactic Cosmic Rays
HEAT: Hate, Extremism, Antisemitism and Terrorism
HF: High Frequency
HHPD: High Hazard Potential Dam
HMA: Hazard Mitigation Assistance Program
HIFLD: Homeland Infrastructure Foundation-Level Data
HMGP: Hazard Mitigation Grant Program
HPAI: Highly Pathogenic Avian Influenza
HIV: Human Immunodeficiency Virus
HMP: Hazard Mitigation Plan
HPV: Human Papillomavirus
IUCN: International Union for Conservation of Nature
LGBTQ2S+: Lesbian, Gay, Bisexual, Transgender, Queer, Two Spirits, Plus
KBDI: Keetch Byram Drought Index
MAOP: Mission Area Operation Plan
MDRO: Multiple-Drug-Resistant Organisms
MERS: Middle Eastern Respiratory Syndrome
MMR: Measles, Mumps, and Rubella
NASA: National Aeronautics and Space Administration
NCA5: Fifth National Climate Assessment for the Northern Great Plains
NCEI: National Centers for Environmental Information
ND BOAH: North Dakota Board of Animal Health
NDCC: North Dakota Century Code
ND DEQ: North Dakota Department of Environmental Quality
NDDES: North Dakota Department of Emergency Management
NDDHHS: North Dakota Department of Health and Human Services
NDDOT: North Dakota Department of Transportation
NDGS: North Dakota Geological Survey
ND GIS Hub: North Dakota Geographic Information Systems Hub
NDDSP: North Dakota Dam Safety Program
NDIT: North Dakota Information Technology
NDNG: North Dakota National Guard
NDHTTF: North Dakota Human Trafficking Task Force
NDSWC: North Dakota State Water Commission
NDDWR: North Dakota Department of Water Resources
NDSLIC: North Dakota State and Local Intelligence Center
NDSU: North Dakota State University
NERC: North American Electric Reliability Cooperation
NFHL: National Flood Hazard Layer
NFIP: National Flood Insurance Program
NFIRS: National Fire Incident Reporting System
NGP: Northern Great Plains
NID: National Inventory of Dams
NIDIS: National Integrated Drought Information System
NLI: National Levee Inventory
NOAA: National Oceanic and Atmospheric Administration

NPR: National Public Radio
NPDP: National Performance of Dams Program
NRC: National Response Center
NRI: National Risk Index
NSC: National Safety Council
NSSL: National Severe Storms Laboratory
NWS: National Weather Service
PA: Public Assistance
PDSI: Palmer Drought Severity Index
PMHSA: Pipeline and Hazardous Materials Safety Administration
PRI: Priority Risk Index
QDRI: Quick Drought Response Index
RL: Repetitive Loss
SAR: Suspicious Activity Report
SARS: Severe Acute Respiratory Syndrome
SHMT: State Hazard Mitigation Team
SMA: Soil Moisture Anomaly
SNAP: Supplemental Nutrition Assistance Program
SPEI: Standard Precipitation and Evapotranspiration Index
SPI: Standardized Precipitation Index
SPLC: Southern Poverty Law Center
SRL: Severe Repetitive Loss
STD: Sexually Transmitted Disease
STEVE: Strong Thermal Emission Velocity Enhancement
STI: Sexually Transmitted Infection
STEC: Shiga Toxin-Producing E. Coli
SWPC: Space Weather Prediction Center
TB: Tuberculosis
TCI/VCI: Temperature Condition Index/Vegetation Condition Index
THIRA: Threat and Hazard Identification and Risk Assessment
TMA: Turtle Mountain Agency
UAS: Unmanned Aircraft Systems
UCR: Uniform Crime Reporting
UN: United Nations
USDA: United States Department of Agriculture
USACE: United States Army Corps of Engineers
USFA: United States Fire Administration
USDA FSA: United States Department of Agriculture Farm Service Agency
USDA RMA: United States Department of Agriculture Risk Management Agency
USDM: United States Drought Monitor
USFA: U.S. Forest Service
USGS: United States Geological Survey
WASA: Williston area safety Association
WASP: Weighted Anomaly Standardized Precipitation
WFAS: Wildfire Assessment Service
WMO: World Meteorological Organization
WSI: Workforce Safety and Insurance
WSSI: Winter Storm Severity Index

WUI: Wildland-Urban Interface
WVC: Wildlife-Vehicle Collisions

A.2 Terminology

Abandoned Mine Lands: Areas adjacent or affected by abandoned mines, which can contain unmined mineral deposits, mine dumps, and tailing that can contaminate the surrounding watershed and ecosystem.
Adversarial Threat: conventional or unconventional methods to counter the state through conflict, insurgency or guerilla warfare to coerce or intimidate.
Aircraft: A civil, military, or public contrivance invented, used or designed to navigate, fly or travel in the air.
Arsenic: naturally occurring chemical in the Earth's crust that becomes problematic at high exposures in food, pollution and drinking water.
Blizzard: A winter storm in which at least one of the following conditions are med: 10 sustained winds or gusts exceeding 35 miles per hour and/or 2) considerable falling and/or blowing snow that reduces visibility below a quarter mile for at least three hours.
Civil Disturbance: civil unrest activity such as a demonstration, riot, or strike that disrupts a community and requires intervention to maintain public safety.
Closed-Basin Flooding: lakes, ponds, and sloughs without natural outlets that rise when there are seasonal increases in rainfall and/or snowmelt that may stay elevated for lengthy periods of time.
Dewpoint Temperature is a measure of the physical quantity of moisture in the air.
Consequence: Degree of debilitating impact that would be caused by the incapacity or destruction of critical infrastructure of a critical function.
Criminal Attacks: an act of violence against the adversary, whether in offense or defense and in whatever territory conducted, or an attack by physical fore in a person for which the attacker is liable to criminal prosecution.
Cyberattacks: actions by sophisticated actors or nation-states to exploit vulnerabilities to steal information and money by deploying the capability to disrupt, destroy or threaten the delivery of essential services.
Dam: An artificial barrier that has the ability to impound water, wastewater, or any liquid-borne material for the purpose of storage or control of water.
Dam Failure: catastrophic event characterized by the sudden, rapid, and uncontrolled release of impounded water.
Debris flows also known as mudslides or mudflows, these are powerful mixtures of rocks, boulders, entire trees, and sometimes, homes or vehicles that are fast-moving, deadly landslides.
Dewpoint: the temperature to which the air must be cooled in order for air to be saturated.
Disaster Mitigation Act of 2000: Public Law 106-390 passed on October 30, 2000, was an amendment to the Robert T Stafford Disaster Relief and Emergency Assistance Act that creates a pre-disaster mitigation grant program among other activities.
Domestic Terrorism: Violent criminal acts committed by individuals and/or groups to further ideological goals stemming from domestic influences, such as those of a political, religious, social, or environmental nature.
Downburst: an area of strong, often damaging winds produced by one or more convective downdrafts
Drought: A period of dry weather sufficiently long enough to cause a serious hydrological imbalance.
Earthquake: a sudden slip on a tectonic fault that releases energy in the form of a wave that travel's the Earth's surface when the stress on the plates overcomes the friction.
Erionite: a naturally occurring microscopic, fibrous mineral that derives from volcanic ash and is similar to asbestos.
Expansive/Unstable Soils: Soils that expand when water is added and shrink when they dry out.

Extreme Heat: a period of summertime weather that is substantially hotter and./or more humid than typical for a given location at that time of year.
Falls (geologic): the detachment of rock or soil from a steep slope, sending soil or rock rolling or bouncing along with the force of gravity.
Flash Floods: When a fast-moving, high volume of water flows into a normally dry area, causing water levels to rapidly increase over a short period of time.
Flooding: the flow of water over normally dry areas.
Foodborne Illness: disease of illness caused by bacteria or fungus in food or water.
Floodplains: areas of land adjacent to bodies of water that are typically inundated during flood events.
Flow (geologic): Spatially continuous shearing that is with a fluid that is more liquid in nature than other landslides and occur rapidly.
Freeze: When the temperatures are persistently below 32 degrees, impacting plant life.
Frost: Formation of ice crystals on the ground or other surfaces that form when the dewpoint is below freezing.
Geologic hazards: earth-related natural phenomena capable of inflicting harm to people or property.
Groundwater: Water that exists beneath the land surface and fills the pores and cracks like water fills a sponge.
Hazard: Something that is potentially dangerous or harmful, often the root cause of an unwanted outcome.
Hazard Mitigation: Any action taken to reduce or eliminate the long-term risk to human life and property from hazards. The term is sometimes used in a stricter sense to mean cost-effective measures to reduce the potential for damage to a facility or facilities from a disaster or incident.
Hate Crime: Crimes committed on the basis of the victim's perceived or actual race, color, religion, national origin, sexual orientation, gender, gender identity or disability.
Hazardous Material Release: Improper leak, discharge, or disposal of hazardous materials or substances which poses a significant threat to human health, safety, property, and the surrounding environment.
Health Disparity: Preventable differences in the burdens of disease, injury, violence, or opportunities to achieve optimal health that are experienced by populations that have been disadvantaged by their social or economic status, geographic location, and environment.
Heat Index: a measure of how hot it really feels when relative humidity is factored in with the actual air temperature.
Heavy Snow: Accumulation of at least 4 inches in 12 hours or fewer, and/or 6 inches in less than 24 hours.
High Dam Release: Operating a dam in a manner that leads to downstream flooding, due to a greater volume of water being permitted to pass through the dam than is typical due to high-water levels behind the dam.
High Hazard Potential Dam: Dams failure or misoperation would likely result in loss of human life.
Human Trafficking: A crime involving the exploitation of someone for the purposes of compelled labor or a commercial sex act through the use of force, fraud, or coercion.
Ice Jam: The barrier formed when frozen waterbodies begin to thaw, ice breaks into pieces called floes, which are carried along by rivers and streams, often jamming at narrow places like bends, bridge crossings, culverts, and shallow areas, restricting water flow.
Ice Storm: Damaging accumulations of ice from freezing rain in excess of a quarter inch.
Incel: Involuntary celibate, or young, heterosexual men who blame women and society for their own inability to form romantic or sexual attachments.
Infectious Diseases: illnesses caused by germs (such as bacteria, viruses and fungi) that enter the body, multiply, and can cause an infection.

International Terrorism: violent, criminal acts committed by individuals and/or groups who are inspired by, or associated with, designated foreign terrorist organizations or nations (state-sponsored).
Landslide: The movement of a mass of rock, debris, or earth down a slope.
Levees: Man-made structures built along rivers and other waterways to protect areas from flooding.
Limited-English Household: This is a household where any members the age of 14 or older have some level of difficulty speaking English.
Low Hazard Dams: Dams with low-hazard potential where failure or misoperation results in no probable loss of human life and low economic loses.
Macroburst: a downburst 2.5 miles across or more.
Malware: Any software used to gain unauthorized access to IT systems in order to steal data, disrupt system services or damage IT networks in any way.
Mass Shooting: An incident in which four or more people are shot or killed, excluding the shooter.
Medium (Significant) Hazard Dams: Dams with the medium-hazard potential where failure or misoperation results in no probable loss of human life, but can cause economic loss, disruption of lifeline facilities, or can impact other concerns.
Microburst: A downburst less than 2.5 miles across
Motor Vehicle: Every description of carriage or other contrivance propelled or drawn by mechanical power and used for commercial purposes in the highways in the transportation of passengers, passengers and property, or property or cargo.
Nation-State Attacks: A hostile action taken against the United States by foreign forces or terrorists, resulting in the destruction of or damage to military targets, injury or death to the civilian population or damage or destruction to public and private property.
Natural Hazard: Hazard-related to weather patterns and/or physical characteristics of an area. Often natural hazards occur repeatedly in the same geographical locations.
North Dakota Disaster Relief Fund: Fund created through the North Dakota Century Code 37-17 § 1-27 and funded through the oil and gas fund to provide disaster and hazard mitigation assistance for North Dakota state share of funding for disaster response, recover ana mitigation grants or otherwise reimbursing for search and rescue costs.
Pest Infestation: the occurrence of one or more pest species in an area or location where their numbers and impact are currently or potentially at intolerable levels or a sudden increase in destructiveness or population numbers of a pest species in a given area.
Phishing: Using misleading tactics to get users to share private information online.
Prairie Potholes: Depressional wetlands in formerly glaciated landscapes that fill with water during precipitation events or during snowmelts.
Radon: A naturally occurring radioactive gas that can cause lung cancer that is inert, colorless and odorless.
Ransomware: Malware that holds systems or data captive for payment.
Relative Humidity: the ratio of how much water vapor is in the air compared to how much the air can hold at a given temperature and pressure.
Risk: The potential for loss or damage to an asset.
Riverine Flood: When a water body relating to, formed by, or resembling a river (including tributaries), stream, brook, etc., that rises high enough to cover normally dry land areas.
Robert T Stafford Disaster Relief and Emergency Assistance Act: Originally Public Law 93-288, most recently amended as Public Law 117-328, the Stafford Act provides orderly federal assistance to state and local governments through disaster relief, preparedness, planning, coordination, regulation and mitigation.
Severe Thunderstorm: a rain shower that includes thunder and lightning, hail one inch in diameter or greater, winds exceeding 58 miles per hour and/or a tornado.

Sexually Transmitted Disease: Diseases passed through the exchange of bodily fluids during unprotected sexual contact or sharing of intravenous needles.
Slides (geologic): Downslope movement of rock along a surface or along thin sheer zones
Snow Squall: intense, but limited duration, periods of moderate to heavy snowfall accompanied by gusty surface winds resulting in reduced visibilities and often white-out conditions.
Space Weather: dynamic conditions on the Sun and in the space environment, in particular, near-Earth environment.
Spread (geologic): an area of general subsidence or fracturing of underlying material leading to block subsidence, liquefaction, or lateral movement of the surface material.
Squall Line: A line of storms that have high winds and heavy precipitation but that are arranged in a line and move quickly in a narrow but long line.
Supercell: a highly organized, tilted and rotating mature storm that can last for more than an hour and can reach 50,000 feet into the atmosphere.
Technological Hazard: These hazards originate from technological or industrial accidents, infrastructure failures, or certain human activities. These hazards cause the loss of life or injury, property damage, social and economic disruption, or environmental degradation, and often come with little to no warning.
Threat: Natural, technological, or human-caused occurrence, individual, entity, or action that has or indicates the potential to harm life, information, operations, the environment, and/or property.
Topple: a forward rotation of earthen material below the center of gravity of the displaced material
Tornado: a violently rotating column of air that extends from a thunderstorm to the ground.
Train: One of more locomotives coupled with or without cars.
Uranium: A naturally occurring by-product of the decay process of rock. Vessel: Any watercraft, other than a seaplane on the water, used or capable of being used as a means of transportation on water.
Vulnerability: The susceptibility to physical injury, harm, damage, or economic loss. It considers the extent of injury and damages that may result from a hazard event of a given intensity in a given area.
Wet Bulb Globe Temperature: a measure of temperature, relative humidity, solar radiation and wind speed used to determine the stress heat can cause.
Wildfire: Unplanned, unwanted wildland fire, including unauthorized human-caused fires, escaped planned or prescribed wildland fires and any other wildland fire in which the objective is to put the fire out.
Zoonotic: a disease that is spread between animals and people.

B. Planning Team Appendix

B.1 State Hazard Mitigation Team

Mitigation Partners

As part of this Enhanced Mitigation Mission Area Operations Plan update, the following public and private partners were involved and engaged in the process. The specific involvement and role of each partner in the Plan update is detailed in Section 1.

Technical Advisory Committee

North Dakota Department of Emergency Services - Division of Homeland Security, Chair

North Dakota Emergency Management Association, Towner County Emergency Management

National Oceanic and Atmospheric Administration - National Weather Service

North Dakota Department of Agriculture

North Dakota Parks and Recreation

North Dakota Department of Commerce

North Dakota Department of Health and Human Services

North Dakota Department of Transportation

North Dakota Department of Water Resources

Federal Emergency Management Agency

State Hazard Mitigation Team

State Partners

Bank of North Dakota
Job Service North Dakota
North Dakota Aeronautics Commission
North Dakota Attorney General's Office
- Bureau of Criminal Investigation

North Dakota Department of Agriculture
- North Dakota Division of Animal Health
- Pesticide and Fertilizer Division

North Dakota Department of Commerce
- Division of Community Service

North Dakota Department of Emergency Services
- State Radio Communications

North Dakota Department of Health and Human Services

- Medical Services Division

North Dakota Department of Environmental Quality
- Water Quality Division
- Waste Management
- Permitting and Compliance
- Municipal Facilities

North Dakota Department of Transportation
- Communications Division
- Maintenance Division

North Dakota Office of Management and Budget
- Facilities Management Division
- Risk Management Division

North Dakota Department of Mineral Resources
North Dakota Department of Public Instruction
North Dakota Forest Service
North Dakota Geological Survey
North Dakota Department of Water Resources
- Regulatory Division

North Dakota Game and Fish Department
- Wildlife Division

North Dakota Highway Patrol
North Dakota Indian Affairs Commission
North Dakota Information Technology
North Dakota Insurance Department
- North Dakota State Fire Marshal's Office

North Dakota National Guard
- 81st Civil Support Team

North Dakota Parks and Recreation Department
North Dakota Public Service Commission
- Abandoned Land Mines Division

North Dakota State Electrical Board
North Dakota State and Local and Intelligence Center
North Dakota State University:
- Extension Service
- State Climatologist Office
- Center for Social Research

North Dakota University System
North Dakota State Library
North Dakota Workforce Safety and Insurance
State Historical Society of North Dakota

Federal Partners

Bureau of Indian Affairs
- Safety of Dams Program
- Standing Rock Agency, Branch of Wildland Fire Management

Federal Highway Administration

Minot Air Force Base
National Oceanic and Atmospheric Administration - National Weather Service

- NWS Weather Forecast Office, Bismarck ND
- NWS Weather Forecast Office, Grand Forks ND
- NWS Space Weather Prediction Center, Boulder CO

United States Army Corps of Engineers

- St. Paul District
- Omaha District

United States Bureau of Reclamation
United States Economic Development Administration
United States Department of Agriculture

- Natural Resources Conservation Service
- Farm Service
- Forest Service
- Rural Development

United States Department of Homeland Security

- Federal Emergency Management Agency

United States Forest Service
United States Geological Survey

- Dakota Water Science Center

Local/Tribal Partners

North Dakota Emergency Management Association
Burleigh County Emergency Management
Cass County Emergency Management
City of Bismarck Emergency Management
City of West Fargo Emergency Management
Dunn County Planning and Zoning
Foster County Emergency Management
Grand Forks Emergency Management
LaMoure County Emergency Management
Logan County Emergency Management
Towner County Emergency Management
Nelson County Emergency Management
Pembina County Emergency Management
Stutsman County Emergency Management
Ward County Emergency Management
Williams County Emergency Management
MHA Nation Science, Technology & Research Department
Three Affiliated Tribes of the Fort Berthold Reservation
Turtle Mountain Band of Chippewa Indians

Non-Governmental Organizations and Private Partners

Amy Metz, Meteorologist
AARP North Dakota

Barr Engineering
Dakota Valley Electric Cooperative
Heartland Consultants
KLJ Engineering
North Dakota Association of Counties
North Dakota Assistive Technology
North Dakota Center for Persons with Disabilities
North Dakota Wing of the Civil Air Patrol
North Dakota Realtors Association
North Dakota Rural Water
North Dakota Association of Rural Electric Cooperatives
North Dakota Community Foundation
North Dakota Fire Chiefs Association
North Dakota Firefighters Association
North Dakota League of Cities
North Dakota Petroleum Council
North Dakota Safety Council
North Dakota Stockmen's Association
North Dakota Insurance Reserve Fund
North Dakota Township Officers Association
North Dakota Voluntary Organizations Active in Disasters
Nexus Planning
Northern Plains Electric Cooperative
Rossco Crane and Rigging
South Central Dakota Regional Council
University of Mary
Western Dakota Energy Association
4-H Youth Organization

B.2 State Hazard Mitigation Team Committees

Name	Title	Agency	Phone -- Office, Cell	E-Mail	Member Date
NDHMP Technical Advisory Committee					
Darin Hanson, *Ex Officio*	Director	ND Department of Emergency Services (NDDES)-Division of Homeland Security		dthanson@nd.gov	2013
Todd Joerz, *Co-Chair*	State Hazard Mitigation Officer	NDDES-Division of Homeland Security		tjoersz@nd.gov	2013
Kathleen Donahue, *Co-Chair*	State Mitigation Planning Officer	NDDES-Division of Homeland Security		kdonahue@nd.gov	2012
Lori Beck	Towner County Emergency Manager	North Dakota Emergency Management Association		tchd@gondtc.com	2018
Bradley Darr	State Maintenance Engineer	ND Department of Transportation		bdarr@nd.gov	2010
Kent Theurer	Emergency Management Specialist	ND Department of Agriculture		kdtheurer@nd.gov	2018
Shawn Kessel	Chief Operating Officer/Deputy Director	ND Department of Commerce		skessel@nd.gov	2018
Russ Korzeniewski	Disaster Preparedness Administrator/Risk Manager	ND Department of Health and Human Services		rkorzeniewski@nd.gov	2013

Name	Title	Agency	Phone -- Office, Cell	E-Mail	Member Date
Laura Ackerman, P.E.	Souris River Engineer	ND Department of Water Resources		lcackerman@nd.gov	2013
Logan Sand	Acting Senior Community Planner	Federal Emergency Management Agency		logan.sand@fema.dhs.gov	2023
Corey King	Emergency Response Specialist	National Weather Service		corey.king@noaa.gov	2013
Carrie Beth Lasley, Ph.D.	Senior Planner II	AtkinsRealis		carrie.lasley@atkinsrealis.com	2023
Margaret M. Walton, CFM	Senior Planner III	AtkinsRealis		margaret.walton@atkinsrealis.com	2023
Alex Burke	Planner II	AtkinsRealis		alexander.burke@atkinsrealis.com	2023
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Kirk Hagel, *Chair*	Chief of Operations/Intel Supervisor	State and Local Intelligence Center (SLIC), NDDES-Division of Homeland Security		kihagel@nd.gov	2010
Kent Theurer	Emergency Management Specialist	ND Department of Agriculture		kdtheurer@nd.gov	2015
Debbie LaCombe	Grants and Training Chief	NDDES-Division of Homeland Security		dlacombe@nd.gov	2007
Dan Krueger	CI/KR Program Manager & Security Manager	NDDES-Division of Homeland Security		dpkrueger@nd.gov	2023
Jared Baesler	Critical Infrastructure Analyst	NDDES-Division of Homeland Security		jabaesler@nd.gov	2023
Larry Regorrah	Exercise Officer	NDDES, Division of Homeland Security		lregorrah@nd.gov	2018
Lindsay Wold	Director	SLIC-Bureau of Criminal Investigation		liwold@nd.gov	2013
Ben Leingang	Chief Agent	ND Bureau of Criminal Investigation		bleingang@nd.gov	2018
Kyle Linker	Information Security Officer	North Dakota Information Technology		klinker@nd.gov	2023
LTC Daniel Murphy	JC Domestic Operations Director	ND National Guard		daniel.m.murphy7.mil@army.mil	2023
Sgt. Tim Coughlin	Homeland Security Coordinator	State and Local Intelligence Center (Highway Patrol)		tpcoughl@nd.gov	2023

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Tim Wiedrich	Director, Health Response and Licensure	ND Department of Health (ND Department of Health and Human Services)		twiedric@nd.gov	2010
Kyle Emmel	Information Security Analyst	North Dakota Information Technology		kemmel@nd.gov	2023
Natasha Peterson	Business Resilience Coordinator	North Dakota Information Technology		nampeterson@nd.gov	2023
COL David Hall	Chief Information Officer	ND National Guard		david.w.hall66.mil@mail.mil	2019
CW45 Kiel Skager	Information Assurance Manager	ND National Guard		kiel.j.skager.civ@mail.mil	2018
MAJ Shawn Markovic	Commander of the Civil Support Team	ND National Guard, 81st Civil Support Team		shawn.a.markovic.mil@army.mil	2023
MAC Aaron Norgaard	Deputy Commander of Civil Support Team	ND National Guard, 81st Civil Support Team		aaron.s.norgaard.mil@army.mil	2023
F1SG Jesse Handegard	First Sergeant	ND National Guard, 81st Civil Support Team		jesse.d.handegard.mil@army.mil	2023
Amy Anton	Response Chief	NDDES-Division of Homeland Security		ajanton@nd.gov	2007
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Dawn Moen	Loss Control Analyst	ND Office of Management and Budget, Risk Management Division		dmmoen@nd.gov	2018
TSgt Christine Cherry	Minot AFB Plans & Operations NCOIC	American Red Cross, Minot AFB		christine.clucas1@gmail.com; christine.cherry@us.af.mil	2018
Mary Soucie	Director	North Dakota State Library		msoucie@nd.gov	2023
Rodney Onstott	Minot AFB Emergency Management	Minot Air Force Base		rodney.onstott@us.af.mil	2018
Gary Stockert	Emergency Manager	City of Bismarck		gstockert@bismarcknd.gov	2010
Karen Goff, *Chair*	Dam Safety Manager	ND Department of Water Resources		kgoff@nd.gov	2007
Laura Ackerman	Souris River Engineer	ND Department of Water Resources		lcackerman@nd.gov	2013
Chris Korkowski	Investigations Section Chief	ND Department of Water Resources		ckorkowski.@nd.gov	2023
Aaron Carranza	Regulatory Division Director	ND Department of Water Resources		acarranza@nd.gov	2023
Nick Bendickson	Dam Safety Engineer	ND Department of Water Resources		nbendickson@nd.gov	2023
Mike Hall	Coordinator, ND Silver Jackets	ND Department of Water Resources		mihall@nd.gov	2010

Name	Title	Agency	Phone -- Office, Cell	E-Mail	Member Date
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Ken Lake	Dam Tender	U.S. Bureau of Reclamation		klake@usbr.gov	2021
Joe Hall	Area Manager	U.S. Bureau of Reclamation		jhall@usbr.gov	2018
Fred Anderson	Geologist	ND Department of Mineral Resources		fjanderson@nd.gov	2010
Christi Fisher	State Conservation Engineer	Natural Resources Conservation Service		christi.fisher@nd.usda.gov	2018
Scott Winkelman	Game Warden Chief	ND Game and Fish Department		swinkelman@nd.gov	2013
Lynn Spomer	Field Operations Administrator	ND Parks and Recreation		lspomer@nd.gov	2018
Sean Johnson	Plans Chief	ND Parks and Recreation Department		seajohnson@nd.gov	2018
Todd Hauge	Civil Engineer and Regional Safety of Dams Officer	Bureau of Indian Affairs, Safety of Dams Program		todd.hauge@bia.gov	2013
Allen Schlag	Service Hydrologist	National Weather Service		allen.schlag@noaa.gov	2010
Amanda Lee	Service Hydrologist	National Weather Service		amanda.lee@noaa.gov	2023
Rob Zappia	Emergency Management Specialist	U.S. Army Corps of Engineers, St. Paul District		Robert.d.zappia@usace.army.mil	2023

Name	Title	Agency	Phone -- Office, Cell	E-Mail	Member Date
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Spencer Giles	Chief	U.S. Army Corps of Engineers, Omaha District		spencer.w.giles@usace.army.mil;	2023
Todd Linquist	Electrical Engineer	US Army Corps of Engineers, Omaha District		todd.j.lindquist@usace.army.mil	2023
Matt Krajewski	Disaster Program Manager	U.S. Army Corps of Engineers, Omaha District		matthew.s.krajewski@usace.army.mil	2013
Miranda Meehan, Ph.D., *Chair*	Extension Disaster Education Coordinator, Extension Livestock Environmental Stewardship Specialist	North Dakota State University Extension Service		miranda.meehan@ndus.edu	2018
Jim Rand	Chief of Locks and Dams	US Army Corps of Engineers, St. Paul District		jimmy.t.rand@usace.army.mil	2023
Health Placeholder					
Craig Hanson	Chief Lending Officer	Bank of North Dakota		craighanson@nd.gov	2023
Mike Hall	Silver Jackets Coordinator	ND Department of Water Resources		mihall@nd.gov	2010
Joel Quanbeck	Senior Planner	KLJ Engineering		Joel.Quanbeck@kljeng.com	2023

Name	Title	Agency	Phone -- Office, Cell	E-Mail	Member Date
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Pat Fridgen	Division Director, Planning and Education	ND Department of Water Resources		pfridgen@nd.gov	2007
Darin Langerud	Director, Atmospheric Resource Board	ND Department of Water Resources		dlangerud@nd.gov	2007
Jennifer Martin	Hydrologist Manager, Surface Water Section	ND Department of Water Resources		jennifermartin@nd.gov	2019
David Nyhus	Water Resource Engineer	ND Department of Water Resources		dnyhus@nd.gov	2023
Andrew Nygren	Hydrologist Manager, Surface Water Section	ND Department of Water Resources		anygren@nd.gov	2023
Karen R. Ryberg, Ph.D.	Deputy Director, USGS Water Science Center	U.S. Geological Survey		kryberg@usgs.gov	2013
Brent Hanson	Director, USGS Water Science Center	Supervisory Hydrologist		brhanson@usgs.gov	2010
Corby Ward	Chief Brand Inspector	North Dakota Stockmen's Association		cward@ndstockmen.org	2023
Julie Ellingson	Executive Vice President	North Dakota Stockmen's Association		jellingson@ndstockmen.org	2013
Amanda Lee	Service Hydrologist	National Weather Service		amanda.lee@noaa.gov	2023
Jim Kaiser	Warning Coordination Meteorologist	National Weather Service		james.kaiser@noaa.gov	2023
Allen Schlag	Service Hydrologist	National Weather Service		allen.schlag@noaa.gov	2013
Megan Jones	Meteorologist	National Weather Service		megan.e.jones@noaa.gov	2023

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Marcy Svenningsen	Director	USDA Farm Service Agency		marcy.svenningsen@usda.gov	2023
Beau Peterson	Conservation and Livestock Disaster Program Specialist	USDA Farm Service Agency		beau.peterson@usda.gov	2023
Wanda Braton	Program Director	USDA Farm Service Agency		wanda.braton@usda.gov	2023
Janell Quinlan	Planner	Heartland Consultants		jquinlan@heartlandconsultants.org	2023
Todd Joersz	State Hazard Mitigation Officer	NDDES-Division of Homeland Security		tjoersz@nd.gov	2018
Ryan Melin, *Co-Chair*	Fire Manager	ND Forest Service		ryan.melin@ndsu.edu	2010
Doug Nelson, *Co-Chair*	State Fire Marshal	ND Fire Marshal		ddnelson@nd.gov	2017
Tom Claeys	Forestry and Fire Management Team Leader	ND Forest Service		thomas.claeys@ndsu.edu	2007
Michael Odell	Cooperative Fire Manager	ND Forest Service		michael.odell@ndsu.edu	2018

Name	Title	Agency	Phone -- Office, Cell	E-Mail	Member Date
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Joel Boespflug	Fire Chief	Bismarck Fire Department		jboespflug@bismarcknd.gov	2010
Zac Thompson		U.S. Forest Service		zachary.thompson@usda.gov	2023
Jeff Schild	Meteorologist	National Weather Service		jeffrey.schild@noaa.gov	2023
Jeff Thompson	Hazardous Chemical Officer	NDDES-Division of Homeland Security		jathompson@nd.gov	2018
Justin Kincaid	Fire Management Officer	U.S. Forest Service		justin@wfparks.org	2013
Corey King	Emergency Response Specialist	National Weather Service		corey.king@noaa.gov	2013
James Condon	Fire Management Officer	Bureau of Indian Affairs, Standing Rock Agency, Branch of Wildland Fire Management		james.condon@bia.gov	2017
Rob Knuth	Executive Director	ND Firefighters Association		rob@ndfa.net	2013
Scott Winkelman	Chief of Enforcement	ND Game and Fish Department		swinkelman@nd.gov	2013

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Joe Lies	Regional Coordinator	NDDES-Division of Homeland Security		rlies@nd.gov	2018
Eric Upton	Planning Chief	NDDES-Division of Homeland Security		eupton@nd.gov	2023
Russ Korzeniewski	Disaster Preparedness Administrator/Risk Manager	ND Department of Human Services		rkorzeniewski@nd.gov	2013
Steve Dyke	Conservation Supervisor	ND Game and Fish Department		sdyke@nd.gov	2013
Angela Herda	Emergency Manager	Nelson County Emergency Management		aherda@nd.gov	2023
Joel Boespflug	Bismarck Fire Chief	North Dakota Fire Chiefs Association		jboespflug@bismarcknd.gov	2010
Brad Darr	State Maintenance Engineer	ND Department of Transportation		bdarr@nd.gov	2010
Laura Ackerman, *Co-Chair*	Souris River Engineer	ND Department of Water Resources		lcackerman@nd.gov	2013

Name	Title	Agency	Phone -- Office, Cell	E-Mail	Member Date
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Eric Volk	Executive Director	ND Rual Water		ericvolk@ndrw.org	2023
Amanda Lee	Service Hydrologist	National Weather Service		amanda.lee@noaa.gov	2023
Chuck Hyatt	Director, Waste Management Director	ND Department of Environmental Quality		chyatt@nd.gov	2018
Andrew Kirking	Emergency Manager--Northeast Representative	Pembina County		akirking@stutsmancounty.gov	2018
Fred Anderson	Geologist	ND Geological Survey		fjanderson@nd.gov	2010
Benjamin York	Geologist	ND Geological Survey		bcyork@nd.gov	2023
Kenneth Hellevang	Ag Engineer	North Dakota State University Extension Service		kenneth.hellevang@ndus.edu	2018
Pat Fridgen	Division Director, Planning and Education	ND Department of Water Resources		pfridgen@nd.gov	2007
Mike Hall	Silver Jackets Coordinator	ND Department of Water Resources		mihall@nd.gov	2010

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Larry Syverson	Secretary/Director of Governmental Relations	North Dakota Township Officers Association		Larry.ndtoa@gmail.com	2010
Brad Darr	State Maintenance Engineer	ND Department of Transportation		bdarr@nd.gov	2010
Randy Ehlis	Emergency Action Plan Coordinator	U.S. Bureau of Reclamation		rehlis@usbr.gov	2010
Allen Schlag	Service Hydrologist	National Weather Service		allen.schlag@noaa.gov	2013
Jim Kaiser	Warning Coordination Meteorologist	National Weather Service		james.kaiser@noaa.gov	2023
Corey King	Emergency Response Specialist	National Weather Service		corey.king@noaa.gov	2013
Rob Zappia	Emergency Management Specialist	U.S. Army Corps of Engineers, St. Paul District		Robert.d.zappia@usace.army.mil	2023
Jim Rand	Chief of Locks and Dams	US Army Corps of Engineers, St. Paul District		jimmy.t.rand@usace.army.mil	2023
Spencer Giles	Chief	U.S. Army Corps of Engineers, Omaha District		spencer.w.giles@usace.army.mil;	2023

Name	Title	Agency	Phone -- Office, Cell	E-Mail	Member Date
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Matt Krajewski	Disaster Program Manager	U.S. Army Corps of Engineers, Omaha District		Matthew.S.Krajewski@usace.army.mil	2013
Brent Hanson	Supervisory Hydrologist	U.S. Geological Survey		jgallowa@usgs.gov	2010
Joel Galloway	Hydrologic Studies Chief	U.S. Geological Survey		jgallowa@usgs.gov	2018
Rev. Paul Campbell	Chair	ND Voluntary Organizations Active in Disaster		paul.h.campbell@gmail.com	2013
Christi Fisher	State Conservation Engineer	Natural Resources Conservation Service		christi.fisher@nd.usda.gov	2018
Adnan, Akyuz, Ph.D., Ph.D.	State Climatologist	North Dakota State University, State Climatologist Office		adnan.akyuz@ndsu.edu	2010
Carla M. Reinbold	Campus Safety and Security Coordinator	University of Mary		cmreinbold@umary.edu	2018
Lorna Meidinger	Lead Historic Preservationist	State Historical Society of North Dakota		lbmeidinger@nd.gov	2013
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Pierre Freeman	Code Enforcement Officer/Emergency Preparedness Coordinator	City of West Fargo		Pierre.Freeman@westfargond.gov	2018

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Fred Anderson, *Chair*	Geologist	ND Geological Survey		fjanderson@nd.gov	2010
Chris Maike	Geologist	ND Geological Survey		camaike@nd.gov	2018
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Randy Ehlis	Emergency Action Plan Coordinator	U.S. Bureau of Reclamation		rehlis@usbr.gov	2010
Ken Lake	Dam Tender	U.S. Bureau of Reclamation		klake@usbr.gov	2021
Ken Jarolimek	Planner	Heartland Consultants		kjarolimek@heartlandconsultants.org	2023
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Lorna Meidinger	Architectural Historian	State Historical Society of North Dakota		lbmeidinger@nd.gov	2013
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Joan Breiner	Assistant Director of the Abandoned Land Mines Division	ND Public Service Commission		jobreiner@nd.gov	

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Derek Kannenberg, *Chair*	Manager of the Hazardous Waste Program	ND Department of Environmental Quality		dkannenberg@nd.gov	2018
Jeff Thompson	Hazardous Chemical Officer	NDDES		jathompson@nd.gov	2018
Josh Loosmore	Hazardous Chemical Coordinator	NDDES-Division of Homeland Security		jloosmore@nd.gov	2023
L. David Glatt	Director	ND Department of Environmental Quality		dglatt@nd.gov	2013
Gary Haberstroh	Environmental Engineer	ND Department of Environmental Quality		ghaberst@nd.gov	2013
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Chuck Hyatt	Director, Waste Management Director	ND Department of Environmental Quality		chyatt@nd.gov	2018
Jim Semerad	Air Quality, Manager Permitting and Compliance	ND Department of Environmental Quality		jsemerad@nd.gov	2013
Greg Wavra	Program Manager, Drinking Water, Municipal Facilities	ND Department of Environmental Quality		gwavra@nd.gov	2013
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Cody Vanderbusch	Reclamation Specialist	ND Department of Mineral Resources		cwvanderbusch@nd.gov	2023
Michael Ziesch	EGIS Staff Officer	ND Department of Mineral Resources		mdziesch@nd.gov	2013
Derek Hanson	President/CEO	Heartland Consultants		dhanson@heartlandconsultants.org	2023
Rob Knuth	Training Director	ND Firefighters Association		rob@ndfa.net	2013
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MAJ Shawn Markovic	Commander of the Civil Support Team	ND National Guard, 81st Civil Support Team		shawn.a.markovic.mil@army.mil	2023
MAC Aaron Norgaard	Deputy Commander of Civil Support Team	ND National Guard, 81st Civil Support Team		aaron.s.norgaard.mil@army.mil	2023
F1SG Jesse Handegard	First Sergeant	ND National Guard, 81st Civil Support Team		jesse.d.handegard.mil@army.mil	2023
Stephen Herda	Environmental Program Manager	ND National Guard		stephen.p.herda.nfg@mail.mil	2013
Andrew Schirado	Hazardous Waste Manager	ND National Guard		andrew.w.schirado.nfg@army.mil	2018

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Kirby Kruger, *Chair*	Medical Services Division Director	ND Department of Health and Human Services		kkruger@nd.gov	2010
Tracy Miller, Ph.D.	Epidemiologist	ND Department of Health and Human Services		tkmiller@nd.gov	2013
Juli Sickler	Director, Emergency Preparedness and Response	ND Department of Health and Human Services		jsickler@nd.gov	2013
George Gerhardt	Strategic National Stockpile Coordinator	ND Department of Health and Human Services		ggerhardt@nd.gov	2023
Dr. Ethan Andress	State Veterinarian	ND Division of Animal Health		eandress@nd.gov	2023
Dr. Sarah Bailey	Assistant State Veterinarian	ND Department of Agriculture, Division of Animal Health		sbailey@nd.gov	2018
Dr. Beth Carlson	Deputy State Veterinarian	ND Division of Animal Health		bwcarlson@nd.gov	2013
Kent Theurer	Emergency Management Specialist	ND Department of Agriculture		kdtheurer@nd.gov	2015
Samantha Brunner	Plant Industries Division Director	ND Department of Agriculture		sbrunner@nd.gov	2023

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Stacey Alexander	Laboratory Services	ND Department of Health and Human Services		smalexander@nd.gov	2023
Danielle Pinnick	Immunization Surveillance Coordinator	ND Department of Health and Human Services		dpinnick@nd.gov	2023
Charles Elhard	Plant Protection Officer	ND Department of Agriculture		celhard@nd.gov	2018
Scott Peterson	Chief, Wildlife Division	ND Game and Fish Department		speterso@nd.gov	2021
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Corby Ward	Chief Brand Inspector	North Dakota Stockmen's Association		cward@ndstockmen.org	2023

Name	Title	Agency	Phone -- Office, Cell	E-Mail	Member Date
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Dawn Moen	Loss Control Analyst	ND Office of Management and Budget, Risk Management Division		dmmoen@nd.gov	2018
Joel Quanbeck	Senior Planner	KLJ Engineering		Joel.Quanbeck@kljeng.com	2023
John Woutat	First Aid Manager	North Dakota Safety Council		johnw@ndsc.org	2013
Rick Tonder	Director, Facility Planning	North Dakota University System		richard.tonder@ndus.edu	2018
Donna Fishbeck	Chief of Staff	ND Department of Public Instruction		dfishbeck@nd.gov	2023
Bradley Hawk	Health and Human Services Program Manager	ND Indian Affairs Commission		bhawk@nd.gov	2018
Corey King	Emergency Response Specialist	National Weather Service		corey.king@noaa.gov	2013
John Paul Martin	Warning Coordination Meteorologist	National Weather Service		john.paul.martin@noaa.gov	2010
Sean Johnson	Plans Chief	ND Parks and Recreation Department		seajohnson@nd.gov	2018
Russ Korzeniewski	Disaster Preparedness Administrator/Risk Manager	ND Department of Human Services		rkorzeniewski@nd.gov	2013

Name	Title	Agency	Phone -- Office, Cell	E-Mail	Member Date
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Brad Darr	State Maintenance Engineer	ND Department of Transportation		bdarr@nd.gov	2010
Jenny Yearous	Curator of Collections Management	State Historical Society of North Dakota		jyearous@nd.gov	2018
James Schmidt	Executive Director	ND State Electrical Board		jamesschmidt@nd.gov	2018
Kevin Dvorak	President/CEO	ND Community Foundation		kdvorak@ndcf.net	2018
Jim Kaiser	Warning Coordination Meteorologist	National Weather Service		james.kaiser@noaa.gov	2023
Mary Senger	Southwest Emergency Management Representative	Burleigh County		msenger@nd.gov	2013
Christopher Schenk	Disaster Program Manager	Eastern North Dakota and Northwest Minnesota Chapter American Red Cross		Christopher.schenk2@redcross.org	2023
TSgt Christine Cherry	Minot AFB Plans & Operations NCOIC	American Red Cross, Minot AFB		christine.clucas1@gmail.com; christine.cherry@us.af.mil	2018
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Russ Korzeniewski, *Chair*	Disaster Preparedness Administrator/Risk Manager	ND Department of Health and Human Services		rkorzeniewski@nd.gov	2013

Name	Title	Agency	Phone -- Office, Cell	E-Mail	Member Date
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Dawn Moen	Loss Control Analyst	ND Office of Management and Budget, Risk Management Division		dmmoen@nd.gov	2018
John Woutat	First Aid Manager	North Dakota Safety Council		johnw@ndsc.org	2013
Rick Tonder	Director, Facility Planning	North Dakota University System		richard.tonder@ndus.edu	2018
Joel Quanbeck	Senior Planner	KLJ Engineering		Joel.Quanbeck@kljeng.com	2023
Bradley Hawk	Health and Human Services Program Manager	ND Indian Affairs Commission		bhawk@nd.gov	2018
Brad Darr	State Maintenance Engineer	ND Department of Transportation		bdarr@nd.gov	2010
Corey King	Emergency Response Specialist	National Weather Service		corey.king@noaa.gov	2013
John Paul Martin	Warning Coordination Meteorologist	National Weather Service		john.paul.martin@noaa.gov	2010
Jim Kaiser	Warning Coordination Meteorologist	National Weather Service		james.kaiser@noaa.gov	2023
Christy Roemmich	Safety Coordinator	ND Association of Rural Electrical Cooperatives		croemmich@ndarec.com	2013
Paul Davis	Safety Director	ND Association of Rural Electrical Cooperatives		pdavis@ndarec.com	2013

Name	Title	Agency	Phone -- Office, Cell	E-Mail	Member Date
James Schmidt	Executive Director	ND State Electrical Board		jamesschmidt@nd.gov	2018
Jenny Yearous	Curator of Collections Management	State Historical Society of North Dakota		jyearous@nd.gov	2018
Dr. Adnan, Akyuz, Ph.D.	State Climatologist	North Dakota State University, State Climatologist Office		adnan.akyuz@ndsu.edu	2010
Patrick Isakson	Conservation Biologist	ND Game and Fish Department		pisakson@nd.gov	2023
Kevin Dvorak	President/CEO	ND Community Foundation		kdvorak@ndcf.net	2018
Lori Beck	Emergency Manager	North Dakota Emergency Management Association		tchd@gondtc.com	2018
Brent Kahl	Public Assistance Officer	NDDES		bmkahl@nd.gov	2018
Mike McHugh	Aviation Planner	ND Aeronautics Commission		mmchugh@nd.gov	2017
Kimberly Robbins	Southeast Regional Emergency Management Representative	LaMoure County Emergency Management		krobbins@nd.gov	2018
Corey King, *Chair*	Emergency Response Specialist	National Weather Service		corey.king@noaa.gov	2013
Dan Krueger	CI/KR Program Manager & Security Manager	NDDES-Division of Homeland Security		dpkrueger@nd.gov	2023

Name	Title	Agency	Phone -- Office, Cell	E-Mail	Member Date
Jared Baesler	Critical Infrastructure Analyst	NDDES-Division of Homeland Security		jabaesler@nd.gov	2023
Larry Regorrah	Exercise Officer	NDDES, Division of Homeland Security		lregorrah@nd.gov	2018
Amy Metz	Meteorologist/Owner	Amy Metz Reporting		Amymetzreporting@gmail.com	2023
Fred Anderson	Geologist	North Dakota Geological Survey		fjanderson@nd.gov	2018
Gregory Gust	Meteorologist	NDDES-Division of Homeland Security		ggust@nd.gov	2018
Jeffrey Savadel	Meteorologist-in-Charge	National Weather Service		jeffrey.savadel@noaa.gov	2010
Zack Hargrove	Lead Forecaster	National Weather Service		zachary.hargrove@noaa.gov	2023
Jim Kaiser	Warning Coordination Meteorologist	National Weather Service		james.kaiser@noaa.gov	2023
Adnan Akyuz, Ph.D.	State Climatologist	North Dakota State University, State Climatologist Office		adnan.akyuz@ndsu.edu	2010
Mike McHugh	Aviation Planner	ND Aeronautics Commission		mmchugh@nd.gov	2017

Name	Title	Agency	Phone -- Office, Cell	E-Mail	Member Date
Darin Langerud	Director, Atmospheric Resource Board	ND Department of Water Resources		dlangerud@nd.gov	2007
Kari Goelz	Emergency Manager	Grand Forks Emergency Management		karise.goelz@gfcounty.org	2023
Kathleen Donahue	State Mitigation Planning Officer	NDDES-Division of Homeland Security		kdonahue@nd.gov	2010
Brad Darr, *Chair*	State Maintenance Engineer	ND Department of Transportation		bdarr@nd.gov	2010
Stewart Milakovic	Transportation Planner	ND Department of Transportation		smilakovic@nd.gov	2023
Mike Kisse	Assistant Division Director - Maintenance	ND Department of Transportation		mkisse@nd.gov	2023
Brandon Beise	Operations Section Team Leader	ND Department of Transportation		bbeise@nd.gov	2023
Michael Gill, Major	Director of Administration	North Dakota Wing of the Civil Air Patrol		michael.gill@ndcap.us	2023
Lt. Derek Arndt	Assistant Operations Commander	ND Highway Patrol		djarndt@nd.gov	2023
Dawn Moen	Loss Control Analyst	ND Office of Management and Budget, Risk Management Division		dmmoen@nd.gov	2018
Roxanne Anderson	Mitigation Specialist	NDDES, Division of Homeland Security		roxanneanderson@nd.gov	2018
Larry Regorrah	Exercise Officer	NDDES, Division of Homeland Security		lregorrah@nd.gov	2018

Name	Title	Agency	Phone -- Office, Cell	E-Mail	Member Date
Kevin Brodie, P.E.	Transportation Engineer	Federal Highway Administration		Kevin.Brodie@dot.gov	2023
Mike McHugh	Education Coordinator	ND Aeronautics Commission		mmchugh@nd.gov	2018
Bill Brown	Regional Coordinator	NDDES		babrown@nd.gov	2018
Neil Johnson	Regional Coordinator	NDDES		neiljohnson@nd.gov	2018
Kimberly Robbins	Southeast Regional Emergency Management Representative	LaMoure County Emergency Management		krobbins@nd.gov	2018
Corby Ward	Chief Brand Inspector	North Dakota Stockmen's Association		cward@ndstockmen.org	2023
Sean Johnson, *Chair*	Plans Chief	ND Parks and Recreation Department		seajohnson@nd.gov	2018
Phil Peterschick	GIS Section Chief	NDDES, Division of Homeland Security		ppeterschick@nd.gov	2013
Kirk Hagel	Chief of Operations/Intel Supervisor	State and Local Intelligence Center (SLIC), NDDES-Division of Homeland Security		kihagel@nd.gov	2010
Dan Krueger	CI/KR Program Manager & Security Manager	NDDES-Division of Homeland Security		dpkrueger@nd.gov	2023
Jason Stanley	GIS Technician	NDDES, Division of Homeland Security		jestanley@nd.gov	2023

Name	Title	Agency	Phone -- Office, Cell	E-Mail	Member Date
David Bruschwein	Director of Municipal Facilities	ND Department of Environmental Quality		dbruschw@nd.gov	2023
Valquiria Quirino		NDSU Center for Social Research		valquiria.quirino@ndsu.edu	2023
Bruce Hagen	Weatherization Program Manager	ND Department of Commerce		bahagen@nd.gov	2013
Stewart Milakovic	Transportation Planner	ND Department of Transportation		smilakovic@nd.gov	2023
Jon Boyle	Director	Division of Facilities Management		jaboyle@nd.gov	2007
Christi Fisher	State Conservation Engineer	Natural Resources Conservation Service		christi.fisher@nd.usda.gov	2018
Daniel Schwartz	Emergency Manager, President	Logan County, Nexus Planning		loganem@nd.gov	2017
Maria Effertz Hanson	Director	ND Department of Commerce, Division of Community Service		meffertz@nd.gov	2013
Carl Meyer	Hazard Mitigation Specialist	NDDES-Division of Homeland Security		carlmeyer@nd.gov	2023
Aaron Birst	Executive Director	ND Association of Counties		aaron.birst@ndaco.org	2023
Marcia Havens	Labor Market Information Manager	Job Service North Dakota		mehavens@nd.gov	2018

Name	Title	Agency	Phone -- Office, Cell	E-Mail	Member Date
Matt Gardner	Executive Director	ND League of Cities		matt@ndlc.org	2023
Darin Anderson	Director	NDDES, Division of State Radio		darinanderson@nd.gov	2023
Lorna Meidinger	Lead Historic Preservationist	State Historical Society of North Dakota		lbmeidinger@nd.gov	2013
Jeff Tescher	Director of Underwriting	North Dakota Insurance Reserve Fund		jeff.tescher@ndirf.com	2023
Catelin Newell	Director Administrative Services and Information Technology	ND Trust Lands		cnewell@nd.gov	2023
Jenny Yearous	Curator of Collections Management	State Historical Society of North Dakota		jyearous@nd.gov	2018
Joel Quanbeck	Senior Planner	KLJ Engineering		Joel.Quanbeck@kljeng.com	2023
Christy Roemmich	Safety Coordinator	ND Association of Rural Electrical Cooperatives		croemmich@ndarec.com	2013
Gregory Gust, *Co-Chair*	Meteorologist	NDDES-Division of Homeland Security		ggust@nd.gov	2018
Adnan, Akyuz, Ph.D., *Co-Chair*	State Climatologist	North Dakota State University, State Climatologist Office		adnan.akyuz@ndsu.edu	2010

Name	Title	Agency	Phone -- Office, Cell	E-Mail	Member Date
Hope Brighton, *NDDES Lead*	Mitigation Planner	NDDES-Division of Homeland Security		hopebrighton@nd.gov	2023
Karen R. Ryberg, Ph.D.	Deputy Director, USGS Water Science Center	U.S. Geological Survey		kryberg@usgs.gov	2013
Corey King	Emergency Response Specialist	National Weather Service		corey.king@noaa.gov	2013
Chris Parisien	Tribal Policy and Research Support Specialist	Turtle Mountain Band of Chippewa Indians		chris.parisien@tmbci.org	2023
Lisa Lone Fight	Director of Science, Technology and Research	Three Affiliated Tribes of the Fort Berthold Reservation		lisalonefight@gmail.com	2023
Miranda Meehan, Ph.D.	Assoc. Professor/Livestock Environmental Stewardship Spec./Disaster Edu Coord.	NDSU Extension		miranda.meehan@ndsu.edu	2018
Jennifer Skjod	Public Information Officer	Environmental Quality		jskjod@nd.gov	2023
Randy Ehlis	Program Management Specialist	U.S. Bureau of Reclamation		rehlis@usbr.gov	2023
Stewart Milakovic	Transportation Planner	North Dakota Department of Transportation		smilakovic@nd.gov	2023
Corey King	Emergency Response Specialist	NOAA NWS Bismarck, ND		corey.king@noaa.gov	2018

Name	Title	Agency	Phone -- Office, Cell	E-Mail	Member Date
Tyler Weigel	Civil Engineer	Bureau of Reclamation		tweigel@usbr.gov	2023
Megan Jones	Meteorologist / Climate Services Lead	NWS Bismarck		megan.e.jones@noaa.gov	2023
Gary Stockert	Emergency Manager	Bismarck Emergency Management		gstockert@bismarcknd.gov	2018
Aaron Carranza	Regulatory Division Director	ND Department of Water Resources		acarranza@nd.gov	2023
Katie Leitch	Planning Specialist	NDDES - HLS		katieleitch@nd.gov	2023
Laura Horner	Risk MAP Program Manager	Department of Water Resources		lmhorner@nd.gov	2018
Carl Meyer	Hazard Mitigation Specialist	NDDES / Hazard Mitigation		carlmeyer@nd.gov	2023
Fred Anderson	Geologist	North Dakota Geological Survey		fjanderson@nd.gov	2018
Nita Ritzke	Disaster Program Manager	American Red Cross serving Western ND		nita.ritzke2@redcross.org	2023
Christopher Maike	Geologist	North Dakota Geological Survey		camaike@nd.gov	2023
Wanda Braton	Program Director	ND State Farm Service Agency		wanda.braton@usda.gov	2023
Elisha Mueller	Conservation Biologist	North Dakota Game and Fish Department		ekmueller@nd.gov	2023
Patricia Dixon	Office Manager / Admin Asst.	MHA Nation Science, Technology & Research Dept		mha.science.dixon@gmail.com	2023
Kathleen B. Donahue	Deputy Planning Chief	North Dakota Department of Emergency Services		kdonahue@nd.gov	2018

Name	Title	Agency	Phone -- Office, Cell	E-Mail	Member Date
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Jorden Laducer	Community Engagement Training Coordinator	ND Department of Health and Human Services		jladucer@nd.gov	2023
Kylee Merkel, CPA	Business Banker Legislative Directed Programs	Bank of North Dakota		kmerkel@nd.gov	2023
Maria Effertz	Director - DCS	ND Department of Commerce		meffertz@nd.gov	2023
Damon Grabow	Engineer	ND Department of Water Resources		dmgrabow@nd.gov	2023
Karen Goff	Dam Safety Manager	ND Department of Water Resources		kgoff@nd.gov	2007
Mike Hall	Silver Jackets Coordinator	ND Department of Water Resources		mihall@nd.gov	2010
Kyle Erickson	Research Associate	North Dakota Center for Persons with Disabilities		kyle.erickson.1@minotstateu.edu	2023
Lezlee Johnson	Forestry and Fire Management Team Leader	North Dakota Forest Service		lezlee.johnson@ndsu.edu	2023
Darin Langerud	Division Director	ND Department of Water Resources		dlangerud@nd.gov	2007
Eric Jensen, *Co-Chair*	Strategic Communications Chief	NDDES-Division of Homeland Security		ericjensen@nd.gov	2023

Name	Title	Agency	Phone -- Office, Cell	E-Mail	Member Date
Hope Brighton, *Co-Chair*	Mitigation Planner	NDDES-Division of Homeland Security		hopebrighton@nd.gov	2023
Celinda Adair, CFM, *Atkins Liaison*	Senior Planner I	Atkins Global		celinda.adair@atkinsglobal.com	2023
Clint Fleckenstein	Autonomous Systems and Communications Specialist	NDDES-Division of Homeland Security		clintfleckenstein@nd.gov	2023
Joel Quanbeck	Senior Planner	KLJ Engineering		joel.quanbeck@kljeng.com	2023
Daniel Schwartz	Principal	Nexus Planning and Consulting		dschwartz@nexusplanco.com	2017
Jennifer Skjod	Public Information Officer	Environmental Quality		jskjod@nd.gov	2023
Jacob Just	Director of Communications	ND Insurance Department		jjust@nd.gov	2023
Jorden Laducer	Community Engagement Training Coordinator	ND Department of Health and Human Services		jladucer@nd.gov	2023
Kim Schmidt	Communications Manager	Department of Commerce		ksschmidt@nd.gov	2023
Nicole Peske	Communications Division Director	ND Department of Transportation		nipeske@nd.gov	2023
Lee Greuel	Communications Director	ND Department of Water Resources		lmgreuel@nd.gov	2023
Janelle Moos	Associate State Director -- Advocacy	AARP North Dakota		jmoos@aarp.org	2023
Mary Soucie	Director	North Dakota State Library		msoucie@nd.gov	2023

Name	Title	Agency	Phone -- Office, Cell	E-Mail	Member Date
Nita Ritzke	Disaster Program Manager	American Red Cross serving Western ND		nita.ritzke2@redcross.org	2023
Katie Leitch	Planner	NDDES-Division of Homeland Security		katieleitch@nd.gov	2023
Kyle Erickson	Research Associate	North Dakota Center for Persons with Disabilities		kyle.erickson.1@MinotStateU.edu	2023
Kevin Dvorak	President/CEO	ND Community Foundation		kdvorak@ndcf.net	2018
Jill Beck	CEO	North Dakota Realtors		jill@ndrealtors.com	2023
Mary Senger	Southwest Emergency Management Representative	Burleigh County		msenger@nd.gov	2013
Justin Messner, Co-*Chair*	Disaster Recovery Chief	NDDES-Division of Homeland Security		jmessner@nd.gov	2013
Todd Joerz, *Co-Chair*	State Hazard Mitigation Officer	NDDES-Division of Homeland Security		tjoersz@nd.gov	2013
Matt Gardner	Executive Director	ND League of Cities		matt@ndlc.org	2023
Fred Anderson	Geologist	ND Department of Mineral Resources		fjanderson@nd.gov	2010
Daniel Schwartz	Emergency Manager, President	Logan County, Nexus Planning		loganem@nd.gov	2017
Larry Syverson	Secretary/Director of Governmental Relations	North Dakota Township Officers Association		larry.ndtoa@gmail.com	2010

Name	Title	Agency	Phone -- Office, Cell	E-Mail	Member Date
Nathan Davis	Director	ND Indian Affairs Commission		nathan.davis@nd.gov	2023
Kayla Ver Helst	Director of Public Affairs	ND Housing Finance Agency		kverhelst@nd.gov	2018
Bradley Hawk	Health and Human Services Program Manager	ND Indian Affairs Commission		bhawk@nd.gov	2018
Aaron Birst	Executive Director	ND Association of Counties		aaron.birst@ndaco.org	2023
Geoff Simon	Executive Director	Western Dakota Energy Association		geoff@ndenergy.org	2018
Sandy Rohde	Planning & Zoning Administrator	Dunn County		sandy.rohde@dunncountynd.org	2013
L. David Glatt	Director	NDDEQ		dglatt@nd.gov	2013
Ali DeMersseman		US Economic Development Administration		ademersseman@eda.gov	2023
Melanie Bauer-Dukart	Area Specialist	USDA Rural Development		melanie.bauerdukart@usda.gov	2023
Tim Wiedrich	Director, Health Response and Licensure	ND Department of Health and Human Services		twiedric@nd.gov	2010
Brad Darr	State Maintenance Engineer	ND Department of Transportation		bdarr@nd.gov	2010
John Woutat	First Aid Manager	North Dakota Safety Council		johnw@ndsc.org	2013
Darren Brostrum	Director, Unemployment Insurance	Job Service North Dakota		dbrostro@nd.gov	2018

Name	Title	Agency	Phone -- Office, Cell	E-Mail	Member Date
Ron Ness	President/CEO	ND Petroleum Council		roness@ndoil.com	2018
Bradley Hawk	Health and Human Services Program Manager	ND Indian Affairs Commission		bhawk@nd.gov	2018
Ryan Maddock	Research Analyst II	Workforce Safety and Insurance		rpmaddock@nd.gov	2018
Rob Pressly	Community Planner	Federal Emergency Management Agency		robert.pressly@fema.dhs.gov	2023
Tracy Redlin	Director	South Central Dakota Regional Council		tredlin@scdrc.org	2023
Roxanne Anderson	Mitigation Specialist	NDDES-Division of Homeland Security		roxanneanderson@nd.gov	2018
Bruce Hagen	Weatherization Program Manager	ND Department of Commerce		bahagen@nd.gov	2013
Jim Prochniak	Emergency Manager	Cass County Emergency Management		prochniakj@casscountynd.gov	2023
Joel Quanbeck	Senior Planner	KLJ Engineering		joel.quanbeck@kljeng.com	2023
Michael Ziesch, *Chair*	EGIS Staff Officer	ND Department of Mineral Resources		mdziesch@nd.gov	2013
Fred Anderson	Geologist	ND Department of Mineral Resources		fjanderson@nd.gov	2010
Noelyn Meckle	DMR Safety Officer	ND Department of Mineral Resources		nemeckle@nd.gov	2023

Name	Title	Agency	Phone -- Office, Cell	E-Mail	Member Date
Aaron Birst	Executive Director	ND Association of Counties		aaron.birst@ndaco.org	2023
Geoff Simon	Executive Director	Western Dakota Energy Association		geoff@ndenergy.org	2018
Sandy Rohde	Planning & Zoning Administrator	Dunn County		sandy.rohde@dunncountynd.org	2013
L. David Glatt	Director	NDDEQ		dglatt@nd.gov	2013
Brad Darr	State Maintenance Engineer	ND Department of Transportation		bdarr@nd.gov	2010
Derek Kannenberg	Manager of the Hazardous Waste Program	ND Department of Environmental Quality		dkannenberg@nd.gov	2018
John Woutat	First Aid Manager	North Dakota Safety Council		johnw@ndsc.org	2013
Darren Brostrom	Director, Unemployment Insurance	Job Service North Dakota		dbrostro@nd.gov	2018
Jeff White	HSE Director	Rossco Crane and Rigging		jwhite@rosscocrane.com	2023
Ron Ness	President/CEO	ND Petroleum Council		roness@ndoil.com	2018
Ryan Maddock	Research Analyst II	Workforce Safety and Insurance		rpmaddock@nd.gov	2018
Jennifer Skjod	Public Information Officer	Environmental Quality		jskjod@nd.gov	2023

B.3 State Hazard Mitigation Team Attendance

Name	Agency/Department	Kickoff Meeting 2.28.23	Risk Assessment 6.21.23	Mitigation Strategy 11.8.23
Aaron Carranza	ND Department of Water Resources	X		
Alex Burke	Atkins	X	X	X
Alexis Faber	NDDES			X
Ali DeMersseman	US Economic Development Administration	X		
Amanda Bakken	ND Department of Health and Human Services	X		X
Amanda Lee	NOAA/NWS Grand Forks	X	X	X
Amy Anton	NDDES	X		
Andrew Nygren	Department of Water Resources	X		
Angela Herda	Nelson County Emergency Management	X		
April Walker	Barr Engineering			X
Ariana Borrello	FEMA Region 8			X
Beau Peterson	USDA Farm Service Agency			X
Ben Faul	DCS/Commerce			X
Ben Leingang	ND Bureau of Criminal Investigation	X		
Bradley Darr	NDDOT	X	X	X
Brandon Beise	NDDOT	X		
Brenda Vossler	NDDES	X	X	X
Brenton Nesemeier	Department of Health and Human Services - Disease Control	X	X	
Bruce Hagen	ND Dept. of Commerce	X		
Carl Meyer	NDDES	X	X	
Carla Reinbold	University of Mary Campus Safety and Security	X		
Carrie Lasley	Atkins	X	X	X
Catelin Newell	ND Dept of Trust Lands		X	
Charlie Bahnson	ND Game And Fish		X	
Christi Fisher	USDA-NRCS	X		
Christina Ruemmod	ND AREC		X	
Christopher Parisien	Turtle Mountain Band of Chippewa Indians	X		X
Christopher Schenk	Eastern North Dakota and Northwest Minnesota Chapter American Red Cross	X		
Chuck Hyatt	NDDEQ		X	
Clint Fleckenstein	NDDES		X	X

Name	Agency/Department	Kickoff Meeting 2.28.23	Risk Assessment 6.21.23	Mitigation Strategy 11.8.23
Cody VanderBusch	NDIC DMR OGD	X		
Corey King	NOAA, NWS Bismarck, ND	X		X
Damon Grabow	NDDWR	X		
Dan Krueger	NDSLIC		X	
Dan Murphy	ND National Guard			X
Daniel Schwartz	Logan County, North Dakota	X		
Danni Pinnick	NDHHS Disease Control		X	
Darin Hanson	NDDES	X		
Darin Langerud	ND Dept of Water Resources	X	X	X
David Bruschwein	NDDEQ		X	
David Nyhus	ND Department of Water Resources	X		
Dawn Moen	OMB-Risk Management	X	X	X
Debbie LaCombe	NDDES	X	X	
Derek Kannenberg	NDDEQ	X		
Doug Nelson	ND State Fire Marshal Division	X		
Eric Jensen	N.D. Department of Emergency Services	X	X	
Eric Upton	NDDES	X		X
Eric Volk	ND Rural Water	X		
Ethan Andres	NDDOA		X	
Fred Anderson	NDGS	X	X	X
Gary Haberstroh	NDDEQ	X		
Gary Stockert	Bismarck Emergency Management	X		X
George Gerhardt	ND Health and Human Services	X		X
Gregory Gust	NDDES	X	X	X
Hope Brighton	NDDES	X	X	X
Jacob Hall	Bureau of Reclamation			X
Jacob Just	ND Insurance Department	X		
James Schmidt	ND State Electrical Board	X		
James Schmidt	ND State Electrical Board	X		
Janell Quinlan	Heartland Consultants LLC	X		
Jason Stanley	NDDES			X
Jeff Savadel	NOAA/NWS	X		
Jeff Schild	National Weather Service-Bismarck	X	X	X
Jeff Tescher	NDIRF	X		
Jeff Thompson	NDDES		X	
Jennifer Skjod	NDDEQ		X	
Jenny Yearous	State Historical Society of North Dakota	X		
Jerry Dodds	ND Army National Guard			X

Name	Agency/Department	Kickoff Meeting 2.28.23	Risk Assessment 6.21.23	Mitigation Strategy 11.8.23
Jill Beck	North Dakota Realtors	X		
Jim Kaiser	National Weather Service Grand Forks	X	X	X
Jim Prochniak	Cass County, ND	X		
Joel Quanbeck	KLJ	X		
Jorden Laducer	NDDHHS - CEU	X		
Josh Loosmore	NDDES HazChem	X		
Juli Sickler	ND HHS			X
Justin Messner	North Dakota Department of Emergency Services	X	X	X
Karen Goff	ND Department of Water Resources	X		X
Kari Goelz	Grand Forks Emergency Management	X		
Kathleen B. Donahue	North Dakota Department of Emergency Services	X	X	X
Katie Leitch	NDDES		X	X
Kayla Ver Helst	BND		X	
Ken Jarolimek	Heartland Consultants	X		
Ken Lake	US Bureau of Reclamation	X		
Kent D Theurer	North Dakota Department of Agriculture	X		
Kevin J Dvorak	North Dakota Community Foundation	X		
Kimberly Robbins	LaMoure County Department of Emergency Services	X	X	
Kirby Kruger	HHS			X
Kirk Hagel	NDDES/ NDSLIC	X	X	X
Kyle Erickson	North Dakota Center for Persons with Disabilities	X		X
Kyle Linker	NDIT		X	
Kylee Merkel	Bank of North Dakota	X		
Larry Regorrah	ND Dept. of Emergency Services	X	X	
Laura Ackerman	ND DWR			X
Laura Horner	North Dakota Department of Water Resources	X		X
Lindsay Wold	NDBCI/NDSLIC	X	X	X
Lisa Lone Fight	MHA Nation (Fort Berthold Reservation)	X		X
Logan Sand	FEMA Region 8			X
Lori Beck	Towner County EM	X		
Luke McComan	ND Army National Guard		X	

Name	Agency/Department	Kickoff Meeting 2.28.23	Risk Assessment 6.21.23	Mitigation Strategy 11.8.23
Lorna Meidinger	SHSND	X		
Marcy Svenningsen	USDA Farm Service Agency			X
Margaret Kukcok	NDDOH		X	
Margaret Walton	Atkins	X	X	X
Maria Effertz	ND Commerce	X		
Mary Senger	Burleigh County and Emmons County	X	X	X
Mary Soucie	NDSL	X		
McKenzie Richard	ND JOC	X		
Megan Jones	NOAA, NWS Bismarck, ND	X		
Melanie Bauer-Dukart	USDA Rural Development	X		
Michael Gill	Civil Air Patrol	X	X	
Michael Ziesch	Department of Mineral Resources	X	X	
Mike Kisse	NDDOT	X	X	X
Mike McHugh	ND Aeronautics Commission	X	X	
Miranda Meehan	NDSU Extension			X
Natasha Peterson	NDIT	X	X	X
Nick Bendickson	NDDWR		X	
Neil Johnson	NDDES	X		X
Nita Ritzke	American Red Cross		X	X
Noelyn Meckle	Department of Mineral Resources	X		
Pat Fridgen	North Dakota Department of Water Resources	X		
Patrick Isakson	North Dakota Game and Fish Dept	X		
Paul Campbell	ND VOAD	X		
Phillip Peterschick	NDDES	X		
Randy Ehlis	U.S. Bureau of Reclamation	X		
Rob Pressly	FEMA Region 8	X		X
Robert Lies	North Dakota Department of Emergency Management	X		
Roxanne Anderson	ND Department of Emergency Services	X	X	
Russ Korzeniewski	NDHHS		X	X
Ryan Duletski	ND Highway Patrol			X
Ryan Maddock	WSI	X		
Sandra Rohde	Dunn County Planning & Zoning/911 Coordinator	X		
Sarah Bailey	Dept of Ag / State Board of Animal Health	X		

Name	Agency/Department	Kickoff Meeting 2.28.23	Risk Assessment 6.21.23	Mitigation Strategy 11.8.23
Sean Johnson	ND Parks and Recreation Department	X	X	X
Shawn Kessel	Commerce	X		
Sindhuja S. Pillai-Grinolds	ND DWR	X		
Stacey Alexander	ND HHS - Laboratory Services	X		
Stewart Milakovic	NDDOT	X		
Tanner Velegahl	NDARNG		X	
Todd Hauge	BIA/Natural Resources	X		
Todd, William, Joersz	NDDES	X	X	X
Traci Redlin	South Central Dakota Regional Council	X		X
Tyler Spomer	South Central Dakota Regional Council	X	X	X
Tyler Weigel	NDBOR		X	
Valquiria Quirino	NDSU - Center for Social Research	X		
Wanda Braton	USDA FSA		X	X
Zac Thompson	USDA Forest Service	X		

B.4 Data Collection

Dataset	State Agency	Where used
Population Projections by Economic Region, 2018	North Dakota Department of Commerce	Background
Public Transit Provider Service Areas	North Dakota Department of Transportation	Background
State Resource for Disabled Residents	North Dakota Department of Emergency Services	Background
Asthma Rates in North Dakota Counties	North Dakota Behavior Risk Factor Surveillance System	Background
Diabetes Rated in North Dakota Counties, 2021	North Dakota Behavior Risk Factor Surveillance System	Background
Cardiovascular Disease Rates in North Dakota Counties	North Dakota Behavior Risk Factor Surveillance System	Background
Geological Regions of North Dakota	North Dakota Department of Emergency Services	Background
Land Classification by Percentage of State	North Dakota Game and Fish	Background
Endangered and At-Risk Species	North Dakota Game and Fish	Background
State and Federal Ecological and Recreational Areas	North Dakota GIS Hub	Background
NDAWN Network	North Dakota Agricultural Weather Network/NDSU	Background
Point-In-Time Counts of Homeless Persons	North Dakota Continuum of Care	Background
Bakken and Three Forks Formation with Mature Oil Drilling Area	North Dakota Geological Survey	Background
North Dakota Crude Oil Production	North Dakota Department of Mineral Resources	Background
Oil Production Wells in North Dakota, 2023	North Dakota Geological Survey	Background
North Dakota Total Energy Production	North Dakota Department of Commerce	Background
North Dakota Imports and Exports	North Dakota Trade Office	Background
Tourism Spending by County	North Dakota Department of Commerce	Background
Tourism by Segment	North Dakota Department of Commerce	Background
Summary of State Fire and Tornado Policies, 2023	North Dakota State Fire and Tornado Fund	Background
North Dakota Critical Infrastructure Overview	North Dakota Information Technology	Background

Dataset	State Agency	Where used
Energy Production Sites	North Dakota Department of Commerce	Background
North Dakota Trauma System	North Dakota Health and Human Services	Background
North Dakota Health Professional Shortage Areas: Primary Care	North Dakota Department of Health and Human Services	Background
North Dakota EMS Service Areas	North Dakota GIS Hub	Background
State Radio Overview	North Dakota Department of Emergency Services	Background
North Dakota Highway Network	North Dakota GIS Hub	Background
Aviation Resources	North Dakota GIS Hub	Background
Regional Water Systems	North Dakota GIS Hub	Background
Rural Water Districts	North Dakota GIS Hub	Background
Devils Lake Basin Information	North Dakota Division of Water Resources	Flood
North Dakota River Basins	North Dakota Department of Water Resources	Flood
Closed Basin Flooding Areas in North Dakota	North Dakota Department of Water Resources	Flood
North Dakota Risk Assessment Map Service, Stanley	North Dakota Department of Water Resources	Flood
NDSU Livestock Flood Impact Concern	North Dakota State University Extension	Flood
North Dakota Department of Water Resourced Flood Control Projects	North Dakota Department of Water Resources	Flood
Local and Tribal Hazard Mitigation Plan Flood Rating	Local and Tribal Hazard Mitigation Plans	Flood
Local and Tribal Hazard Mitigation Plan Flood Risk Prioritization	Local and Tribal Hazard Mitigation Plans	Flood
Number of Fired and Acres by Cause	North Dakota Emergency Reporting System	Fire
Number of Fires and Acres by Class	North Dakota Emergency Reporting System	Fire
Fire Department Staffing Data	North Dakota Fire Marshal's Office Certificate of Fire Department Existence Program	Fire
Agricultural Productions Statistics	North Dakota Department of Agriculture	Fire
North Dakota Agricultural Industry Economic Contribution Analysis Summary report	North Dakota State University Extension	Fire

Dataset	State Agency	Where used
Local and Tribal Mitigation Plan Wildfire Risk Prioritization	Local and Tribal Mitigation Plans	Fire
Local and Tribal Mitigation Plan Wildfire Risk Prioritization Map	Local and Tribal Mitigation Plans	Fire
Reductions in Range and Pasture Production, July 2021	NDSU Extension	Drought
Reductions in Feed Inventory, July 2021	NDSU Extension	Drought
Reductions in Livestock Herd Size, July 2021	NDSU Extension	Drought
Hay Hotline Data	North Dakota Department of Agriculture	Drought
Drought Disaster Livestock Water Supply Data	North Dakota Department of Water Resources	Drought
North Dakota Consumptive Water Use, 2022	North Dakota Department of Water Resources	Drought
North Dakota Permitted Water Use, 2013-2020	North Dakota Department of Water Resources	Drought
Access Points not Served by Broadband, 2021	Broadband Association of North Dakota, 2021	Cyberattack
Local and Tribal Mitigation Plans Assessment of Cyberattack Risk by County	Local and Tribal Mitigation Plans	Cyberattack
Spring Road Restriction Days on North Dakota Highways	North Dakota Department of Transportation	Severe Winter Weather
April 2022 Storm Livestock Challenges	NDSU Extension	Severe Winter Weather
Local and Tribal Hazard Mitigation Plans Rating Severe Winter Weather	Local and Tribal Mitigation Plans	Severe Winter Weather
Severe Summer Hazard Community Mitigation Projects	North Dakota Department of Emergency Services	Severe Summer Weather
Local and Tribal Mitigation Plans and Severe Summer Weather	Local and Tribal Mitigation Plans	Severe Summer Weather
COVID-19 Infections	North Dakota Department of Health and Human Services	Infectious Diseases and Pest Infestations
COVID-19 Hospitalizations	North Dakota Department of Health and Human Services	Infectious Diseases and Pest Infestations
COVID-19 Deaths	North Dakota Department of Health and Human Services	Infectious Diseases and Pest Infestations
COVID-19 Rolling Average of Hospital Admissions	North Dakota Department of Health and Human Services	Infectious Diseases and Pest Infestations

Dataset	State Agency	Where used
COVID-19 ICU Bed Utilization	North Dakota Department of Health and Human Services	Infectious Diseases and Pest Infestations
COVID-19 Rolling Average of COVID-associated deaths	North Dakota Department of Health and Human Services	Infectious Diseases and Pest Infestations
Distribution of Variants by Month of Specimen Collection	North Dakota Department of Health and Human Services	Infectious Diseases and Pest Infestations
COVID-19 New Cases for the Week of November 17, 2023	North Dakota Department of Health and Human Services	Infectious Diseases and Pest Infestations
Per Capita Covid-19 Cases by County	North Dakota Department of Health and Human Services	Infectious Diseases and Pest Infestations
COVID-19 Vaccination Rates by Percentage of Population as of July 13, 2023	North Dakota Department of Health and Human Services	Infectious Diseases and Pest Infestations
Novel Cases of MDROs in North Dakota 2018-2022	North Dakota Department of Health and Human Services	Infectious Diseases and Pest Infestations
West Nile Virus Cases by County 2018, 2022	North Dakota Department of Health and Human Services	Infectious Diseases and Pest Infestations
Animal West Nile Virus Cases, 2021-2022	North Dakota Board of Animal Health	Infectious Diseases and Pest Infestations
Epizootic Hemorrhagic Disease Reports in North Dakota, 2021	North Dakota Game and Fish	Infectious Diseases and Pest Infestations
Epizootic Hemorrhagic Disease Confirmed Cases, 2021-22	North Dakota Board of Animal Health	Infectious Diseases and Pest Infestations
Counties with Animal Anthrax Cases, 2006-2022	North Dakota Board of Animal Health	Infectious Diseases and Pest Infestations
HPAI Cases in Wild Birds by County, 2022	North Dakota Board of Animal Health	Infectious Diseases and Pest Infestations
HPAI Cases by Flock Type	North Dakota Board of Animal Health	Infectious Diseases and Pest Infestations
HPAI Cases by County in North Dakota	North Dakota Board of Animal Health	Infectious Diseases and Pest Infestations
Harmful Algal Bloom Advisories for July 25, 2023	North Dakota Department of environmental Quality	Infectious Diseases and Pest Infestations
Influenza by the Numbers in North Dakota, 2016-2023	North Dakota Department of Health and Human Services	Infectious Diseases and Pest Infestations
Mumps Cases in North Dakota since 2000	North Dakota Department of Health and Human Services	Infectious Diseases and Pest Infestations
North Dakota Influenza Vaccination by Age	North Dakota Department of Health and Human Services	Infectious Diseases and Pest Infestations
North Dakota Pneumococcal Vaccination by Age	North Dakota Department of Health and Human Services	Infectious Diseases and Pest Infestations

Dataset	State Agency	Where used
Infant Vaccination Rates in North Dakota	North Dakota Health and Human Services	Infectious Diseases and Pest Infestations
Tuberculosis Cases in North Dakota since 2000	North Dakota Department of Health and Human Services	Infectious Diseases and Pest Infestations
Syphilis Cases in North Dakota since 2000	North Dakota Department of Health and Human Services	Infectious Diseases and Pest Infestations
Salmonellosis Cases in North Dakota since 2000	North Dakota Department of Health and Human Services	Infectious Diseases and Pest Infestations
Malaria Cases in North Dakota since 2000	North Dakota Department of Health and Human Services	Infectious Diseases and Pest Infestations
Tularemia Cases in North Dakota since 2000	North Dakota Department of Health and Human Services	Infectious Diseases and Pest Infestations
West Nile Virus Cases in North Dakota since 2000	North Dakota Department of Health and Human Services	Infectious Diseases and Pest Infestations
Lyme Disease Cases in North Dakota since 2000	North Dakota Department of Health and Human Services	Infectious Diseases and Pest Infestations
COVID-19 Cases in North Dakota by Race as of June 7, 2023	North Dakota Department of Health and Human Services	Infectious Diseases and Pest Infestations
COVID-19 Vaccinations by Race in North Dakota	North Dakota Department of Health and Human Services	Infectious Diseases and Pest Infestations
COVID-19 Impact on State GDP	North Dakota Department of Commerce	Infectious Diseases and Pest Infestations
COVID-19 Impact on State GDP	North Dakota Department of Commerce	Infectious Diseases and Pest Infestations
COVID-19 Impact on State Labor Force	North Dakota Department of Commerce	Infectious Diseases and Pest Infestations
Ownership of North Dakota Dams	North Dakota Dam Safety Program	Dam Failure
Dam Function	North Dakota Dam Safety Program	Dam Failure
Dam Classification	North Dakota Dam Safety Program	Dam Failure
Ranking of Dam Failure in Local and Tribal Mitigation Plans	Local and Tribal Mitigation Plans	Dam Failure
HazMat Spill Decision Process	Unified Reporting System, 2023	Hazardous Material Release
Hazardous Material Labels	North Dakota Department of Environmental Quality	Hazardous Material Release
Location of Incidents Reported to the State Web EOC, 2019-2020	North Dakota Department of Emergency Services	Hazardous Material Release
Location of Incidents Reported to the State via HazConnect, 2021-23	North Dakota Department of Emergency Services	Hazardous Material Release
HazConnect Incidents by Location	North Dakota Department of Emergency Services	Hazardous Material Release
Web EOC Incidents by Year	North Dakota Department of Emergency Services	Hazardous Material Release

Dataset	State Agency	Where used
HazConnect Incidents by Year	North Dakota Department of Emergency Services	Hazardous Material Release
HazConnect Incidents by Agency and Status, 2021-23	North Dakota Department of Emergency Services	Hazardous Material Release
HazConnect Incidents by Type	North Dakota Department of Emergency Services	Hazardous Material Release
WebEOC Incidents by Quarter	North Dakota Department of Emergency Services	Hazardous Material Release
HazConnect Incidents by Quarter	North Dakota Department of Emergency Services	Hazardous Material Release
HazConnect Incidents by Time of Day	North Dakota Department of Emergency Services	Hazardous Material Release
Areas of Landslides in North Dakota	North Dakota Geologic Survey	Geologic Hazards
Abandoned Mine Lands in North Dakota	North Dakota Public Service Commission	Geologic Hazards
Abandoned Mine Lands by County	North Dakota Public Service Commission	Geologic Hazards
Known and Suspected Erionite Areas	North Dakota Department of Environmental Quality	Geologic Hazards
Known Areas of Uranium Occurrence within 200 feet of the Surface	North Dakota Geologic Survey	Geologic Hazards
Tectonic Features in North Dakota and the region	North Dakota Geologic Survey	Geologic Hazards
Locations of Past North Dakota Earthquakes	North Dakota Geologic Survey	Geologic Hazards
Earthquakes Felt in North Dakota	North Dakota Geologic Survey	Geologic Hazards
Local and Tribal Hazard Mitigation Plans Rating Geologic Hazard	Local and Tribal Hazard Mitigation Plans	Geologic Hazards
Local and Tribal Hazard Mitigation Plans Rating Space Weather	Local and Tribal Hazard Mitigation Plans	Space Weather
Local and Tribal Hazard Mitigation Plans Rating Adversarial Attacks	Local and Tribal Mitigation Plans	Terrorist or Nation-State Attacks
Jurisdictions with Most Drug Cases Per 1,000 Residents	North Dakota Crime Statistics	Criminal Attacks
Incarcerated Population	North Dakota Department of Corrections	Criminal Attacks
Human Trafficking Cases and Resources, 2020	North Dakota Human Trafficking Task Force	Criminal Attacks
Locations for Crimes Against People	North Dakota Attorney General	Criminal Attacks
Crimes in North Dakota, 2019-22	North Dakota Attorney General	Criminal Attacks
Crimes Against People in North Dakota	North Dakota Attorney General	Criminal Attacks

Dataset	State Agency	Where used
Drug/Narcotic Seizures, 2019-2022	North Dakota Attorney General	Criminal Attacks
Incarcerated Population 2004-2023	North Dakota Department of Corrections	Criminal Attacks
Terrorist Screening Center Encounters, 2018-2022	North Dakota State and Local Intelligence Center	Nation-State and Terrorist Attacks
Suspicious Activity Reports	North Dakota State and Local Intelligence Center	Nation-State and Terrorist Attacks
2022 Traffic Fatalities	North Dakota Department of Transportation	Transportation Incidents
Airfields in North Dakota	North Dakota Department of Emergency Services	Transportation Incidents
Railroad Network in North Dakota	North Dakota Department of Transportation	Transportation Incidents
Highway Network in North Dakota	North Dakota Department of Transportation	Transportation Incidents
Accidents Involving Walking or Biking	North Dakota Department of Transportation	Transportation Incidents
Crude Oil Pipeline Networks in North Dakota	North Dakota Pipeline Authority	Transportation Incidents
Refined Product Network in North Dakota	North Dakota Department of Transportation	Transportation Incidents
Aircraft Based in North Dakota	North Dakota State Aeronautics Commission	Transportation Incidents
Pilots in North Dakota	North Dakota State Aeronautics Commission	Transportation Incidents
Annualized Motor Vehicle Crash Rates	North Dakota Department of Transportation	Transportation Incidents
North Dakota Vehicles and Miles	North Dakota Department of Transportation	Transportation Incidents
North Dakota Interstate Traffic Distribution	North Dakota Department of Transportation	Transportation Incidents
Motor Vehicle Human Consequences, 2017-2021	North Dakota Department of Transportation	Transportation Incidents
Weather Conditions Contributing to Vehicle Fatalities	North Dakota Department of Transportation	Transportation Incidents
Risk Factors in Motor Vehicle Accidents, 2020-2022	North Dakota Department of Transportation	Transportation Incidents
Proposed State Bicycling Network	North Dakota Department of Transportation	Transportation Incidents
Motor Vehicle Fatalities	North Dakota Department of Transportation	Transportation Incidents

Dataset	State Agency	Where used
Bridges in North Dakota in Poor Condition	North Dakota Department of Transportation	Transportation Incidents
North Dakota Road Statistics	North Dakota Department of Transportation	Transportation Incidents
Annualized Human Consequences for North Dakota Vehicle Accidents, 2018-2022	North Dakota Department of Transportation	Transportation Incidents
Costs of North Dakota Accidents, 2017-2021	North Dakota Department of Transportation	Transportation Incidents
Local and Tribal Mitigation Plans and Transportation Incidents	Local and Tribal Mitigation Plans	Transportation Incidents

B.5 Outreach

B.5.1 Outreach Strategy and Appendices
B.5.2 Public Survey and Public Survey Results
B.5.3 Public Survey Publicity and Notice
B.5.4 Community Survey and Survey Results
B.5.5 Community Survey Publicity and Notice
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B.5.7 June Public Meeting Documentation
B.5.8 November 2023 Public Meeting Documentation
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B.5.1 Outreach Strategy and Appendices

B.5.1.1 Atkins Project Team Staff

Name	Title	Organization	Email	Phone
Carrie Beth Lasley	Senior Planner	AtkinsRealis	carrie.lasley@atkinsrealis.com	
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Celinda Adair	Senior Planner	AtkinsRealis	celinda.adair@atkinsrealis.com	
Alex Burke	Senior Planner	AtkinsRealis	alexander.burke@atkinsrealis.com	
Heather Allemang	Senior Planner	AtkinsRealis	heather.allemang@atkinsrealis.com	

B.5.1.2 Outreach Schedule and Activity Tracker

Timeframe (Date)	Activity	Lead Organization	Primary Contact	Support Organization(s) & Individuals	Target Audiences (Attendees)	Notes
October 19, 2022	**Community Coffee - Adams County**	NDDES	Hope Brighton	Adams County	Adams County community members	Small group participating; however, wildfire and pest infestation were talked about in detail. In addition. Cyber-attack was brought to attention as those in very rural communities rely on the internet for relevant information, communication, and income. Decreasing population is a concern with keeping up with businesses and keeping an economic base for the community. Drug use was also a major concern. When talking about vulnerable groups, elderly, chronically ill, and single parents were all mentioned vulnerable groups.
October 26, 2023	**Community Coffee - NDSU Emergency Management Students**	NDDES	Hope Brighton		College Students	• Introduced emergency management as a professional to the 2022 Professional Development Class through the NDSU Emergency Management and Disaster Science program. Provided an overview of the field and myself. • Attention brought to technological disasters and considering climate change in the future of disasters • Talked about College Students vulnerability or other gap in the Fargo community that could act as a hazard specifically to this populations,

Timeframe (Date)	Activity	Lead Organization	Primary Contact	Support Organization(s) & Individuals	Target Audiences (Attendees)	Notes
						answers were: Winter Storm, Active Shooter (Criminal Attack), Flood, and Train Derailments • Followed this conversation with preparedness actions and advocating on campus for an active emergency management and preparedness culture
July 6, 2022	**Lunch and Learn: Extreme Climate Variability and Potential Climate Change**	NDDES	Hope Brighton		General public	
July 19, 2022	Neutral Grounds Meeting	NDDES	Hope Brighton		Oil and Gas Community	Refer to neutral grounds meeting notes document
November 28, 2022	Meeting with New Americans/Foreign Born/Immigrants Board	NDDES	Hope Brighton		Immigrant and Foreign-Born members of the public	Provided an overview – comments included worry about Phishing or other voice over cyberattacks, as many are worried about proper documentation, they are vulnerable to these attacks especially if they do not speak English as their first language. Talked about fire risk with covering windows with blankets – unaware of proper insulation and winter weather preparedness. Limited access to public transportation with potential to be socially isolated.

Timeframe (Date)	Activity	Lead Organization	Primary Contact	Support Organization(s) & Individuals	Target Audiences (Attendees)	Notes
November 29, 2022	BeYou Health Advisory Board for LGBTQ2S+ Meeting	NDDES	Hope Brighton, Katie Leitch, Kathleen Donahue		LGBTQ2S+ individuals and representatives	Provided an overview of hazards, comments included: Most concerning? Voices aren't shared across communities, prioritization and concerns of civil disturbance and targeted violence with limited programs. Anti – gay and trans legislation, Patriot front, protests from extremist groups targeting, no repercussions for ambulance drivers or medical staff who refuse care, turned away from shelter, chaos and command have cultural education for Ems and first responders. State of ND can be denied housing based on sexual orientation and gender identity – laws do not protect. Deliberate conversations for those protected under, EMT at disaster sights – not getting medical attentions. Health equity office is finally being represented at the table. Look at efforts for outreach is strategic plans.

Timeframe (Date)	Activity	Lead Organization	Primary Contact	Support Organization(s) & Individuals	Target Audiences (Attendees)	Notes
December 4, 2022	Youth Advisory Board Meeting	NDDES	Hope Brighton, Katie Leitch, Kathleen Donahue		Youth (students)	Provided an overview of hazards, comments included: Worry about Active shooter events in schools and communications, Experience with winter weather, but keeping phones charged, and using the NDROADs app to keep up to date, One student shared that she served on her local fire department as a volunteer, but shared that she experiences some challenges when returning back to high school and students are talking with an outside perspective and not realizing she was there to experience it. Facilitators suggested that the first responder groups in her community should seek CISM training for the staff. Talked about Climate Change and how the media portrays information to students with a huge problem regarding misinformation.
December 2022	Annual Mitigation Report	NDDES	Hope Brighton, Katie Leitch, Kathleen Donahue			
May 2023	Draft Outreach Strategy	Atkins	Celinda Adair	NDDES	NDDES, FEMA	

Timeframe (Date)	Activity	Lead Organization	Primary Contact	Support Organization(s) & Individuals	Target Audiences (Attendees)	Notes
May 9, 2023	Outreach Committee Meeting	NDDES	Hope Brighton	Atkins	See "2023 Committees - Mitigation MOAP Team Members" MS Excel Spreadsheet for entire list	
May 17, 2023	Oil and Gas Committee Meeting	NDDES	Hope Brighton Planning Section*	Atkins	See "2023 Committees - Mitigation MOAP Team Members" MS Excel Spreadsheet for entire list	
May 18, 2023	Climate Change Committee Meeting	NDDES	Hope Brighton, Greg Gust	Atkins	See "2023 Committees - Mitigation MOAP Team Members" MS Excel Spreadsheet for entire list	
May 18, 2023	Local Planning and Coordination Capability Committee Meeting	NDDES	Planning Section*	Atkins	See "2023 Committees - Mitigation MOAP Team Members" MS Excel Spreadsheet for entire list	
May 25, 2023	Drought Committee Meeting	NDDES	Planning Section*	Atkins	See "2023 Committees - Mitigation MOAP Team Members" MS Excel Spreadsheet for entire list	
May 31, 2023	Infectious Disease Committee Meeting	NDDES	Planning Section*	Atkins	See "2023 Committees - Mitigation MOAP Team Members" MS Excel Spreadsheet for entire list	
May 31, 2023	Severe Summer Weather Committee Meeting	NDDES	Planning Section*	Atkins	See "2023 Committees - Mitigation MOAP Team Members" MS Excel Spreadsheet for entire list	
June 1, 2023	Severe Winter Weather Committee Meeting	NDDES	Planning Section*	Atkins	See "2023 Committees - Mitigation MOAP Team Members" MS Excel Spreadsheet for entire list	
June 5, 2023	Space Weather Committee Meeting	NDDES	Planning Section*	Atkins	See "2023 Committees - Mitigation MOAP Team Members" MS Excel Spreadsheet for entire list	

Timeframe (Date)	Activity	Lead Organization	Primary Contact	Support Organization(s) & Individuals	Target Audiences (Attendees)	Notes
June 5, 2023	Transportation Committee Meeting	NDDES	Planning Section*	Atkins	See "2023 Committees - Mitigation MOAP Team Members" MS Excel Spreadsheet for entire list	
June 6, 2023	Critical Infrastructure Committee Meeting	NDDES	Planning Section*	Atkins	See "2023 Committees - Mitigation MOAP Team Members" MS Excel Spreadsheet for entire list	
June 7, 2023	Adversarial Threats Committee Meeting	NDDES	Planning Section*	Atkins	See "2023 Committees - Mitigation MOAP Team Members" MS Excel Spreadsheet for entire list	
June 7, 2023	Geologic Hazards Committee Meeting	NDDES	Planning Section*	Atkins	See "2023 Committees - Mitigation MOAP Team Members" MS Excel Spreadsheet for entire list	
June 7, 2023	Equity Resources Committee Meeting	NDDES	Planning Section*	Atkins	See "2023 Committees - Mitigation MOAP Team Members" MS Excel Spreadsheet for entire list	
June 8, 2023	Flood Committee Meeting	NDDES	Planning Section*	Atkins	See "2023 Committees - Mitigation MOAP Team Members" MS Excel Spreadsheet for entire list	
June 8, 2023	Dam Failure Committee Meeting	NDDES	Planning Section*	Atkins	See "2023 Committees - Mitigation MOAP Team Members" MS Excel Spreadsheet for entire list	
June 16, 2023	Send out Survey for Local Community Staff	NDDES	Planning Section*	Atkins (Celinda)	Local Emergency Managers, Floodplain Managers, Planners, Public Works Directors, Fire Marshalls, Etc.	Atkins can prepare draft survey in Microsoft Forms and send it to NDDES to review.
June 16, 2023	Send out Survey for Stakeholder and General Public	NDDES	Planning Section*	Atkins (Celinda & Margaret)	State agencies, committee members, general public	Atkins can prepare draft survey in Microsoft Forms and send it to NDDES to review.
June 19, 2023	Fire Committee Meeting	NDDES	Planning Section*	Atkins	See "2023 Committees - Mitigation MOAP Team Members" MS Excel Spreadsheet for entire list	

Timeframe (Date)	Activity	Lead Organization	Primary Contact	Support Organization(s) & Individuals	Target Audiences (Attendees)	Notes
June 21, 2023	Risk Assessment meeting with NDDES staff, Atkins, and committee leads	NDDES	Planning Section*	Atkins		
June 21, 2023	Public Meeting in Bismarck - Discuss Risk Assessment	NDDES	Eric Jensen, Planning Section*	Atkins	General public	Evening - 6:30 to 8 PM
June 22, 2023	Minot State University Center for Persons with Disabilities (CDPC) Meeting	NDDES	Hope Brighton		Persons with disabilities and their representatives	
July 26, 2023	Safe Industry Alliance Meeting	NDDES	Hope Brighton			The second meeting of the Safe Industry Alliance was held at the Flint Rock Building north of Dickinson, ND. This newly formed organization strives to unite industry and advance safety practices. Hope Brighton presented information on the ND Department of Emergency Services and particularly the mitigation process. She provided an overview of the states fourteen (14) identified hazards, defining each with examples of recent significant ND events. The presentation included interactive feedback through a google forms survey. Participants engaged in ranking the hazards in order of most significant to them, likelihood of occurring, impact,

Timeframe (Date)	Activity	Lead Organization	Primary Contact	Support Organization(s) & Individuals	Target Audiences (Attendees)	Notes
						and vulnerability. Hope provided a few examples of mitigation actions as the survey also provided the opportunity for participants to make suggestions on possible mitigation actions. The survey results were reviewed and discussed. The following situations were addressed: Saltwater tanks and lightning. The use of lightning rods is less than previous. Lightning strikes can cause significant damage to equipment and/or fire. Winter weather. The greatest impact on this group was loss of access due to blocked roads. Saturated ground resulting from flooding and heavy rainfall can cause significant damage to roads and hinder access. Hope thanked the group for their participation. Discussion following the meeting included recommendations for the group to have some follow up discussion with Jeff Thompson, HazChem Officer and ND Department of Emergency Services.
August 11, 2023	Mitigation Outreach	NDDES	Planning Section*			Hope Brighton and Katie Leitch connected with Leigh Ann Skurupey to explore collaborating with 4-H throughout the state. Staff found that 4-H already has a

Timeframe (Date)	Activity	Lead Organization	Primary Contact	Support Organization(s) & Individuals	Target Audiences (Attendees)	Notes
						focus on self reliance within the future of ag, with disaster preparedness magnifying this mission. This may be a future group to conduct community coffee with.
September 7, 2023	WASA Meeting Williston, ND	NDDES	Hope Brighton	Williams County Emergency Manager		Discussion on Technical Hazards: Transportation, HazMat, Cybersecurity, and Flooding. Discussion on Natural Hazards: Snow and Ice, Pest Infestations, Drought, Wind, Earthquakes. Mitigation Plan Rankings and Mitigation Ideas discussed.
September 2023	Posters placed in community locations (IMM Apartments transitions yoga, and Gateway mall) to advertise the public survey for the project	NDDES	Hope Brighton, Kathleen Donahue	General public	General public	
October 2023	Establish online outreach hub for project	Atkins	Celinda Adair	NDDES		
November 9, 2023	Public Meeting - mitigation strategy feedback	NDDES	Hope Brighton	Atkins - Heather Allemang (in-person)	general public - rural residents	Eagles Lodge, Barnes County, ND - Participants from Valley City had a roundtable discussion to explore the threats and hazards within and outside of Barnes County. With the relevancy of aging infrastructure, residents

Timeframe (Date)	Activity	Lead Organization	Primary Contact	Support Organization(s) & Individuals	Target Audiences (Attendees)	Notes
						discussed Dam Failure and Severe Winter Weather and the impact on their community. Participants had a wide range of actions and ideas, considering concrete tunnels or other unused areas as shelters to be retrofitted.
November 14, 2023	**Community Coffee - NDSU Emergency Management Students**	NDDES	Hope Brighton	NDSU Emergency Management and Disaster Science	College Students	NDSU Emergency Management and Disaster Science invited program Alumni, Hope Brighton, to present to the professional development class about the field of emergency management and other topics. Professor, Dr. Carol Cwiak and students brought up several good points and informed on upcoming topics in the field including the close collaboration with the NWS. As for hazards, students were most concerned about severe winter and summer weather, flood, train derailments, and had questions on Space Weather. In addition, some participants of the class had just been to IAEM where they mentioned the talk of Civil War was brought up several times and the involvement with emergency management. Lastly, the partnership between private and public organizations was highlighted as we depend on business

Timeframe (Date)	Activity	Lead Organization	Primary Contact	Support Organization(s) & Individuals	Target Audiences (Attendees)	Notes
						partners to provide essential needs and often are not in the spotlight for disaster awareness or showcasing negative aspects of business and disasters (i.e. Carol's daughter works for a trucking logistics company and paid millions to get out a ransomware attack).
November, 29	**Community Coffee - 4H Educators, volunteers, and administration**	NDDES	Hope Brighton and Katie Leitch	Via Zoom	ND Agricultural Community	

- NDDES Planning Section members, led by Section Chief Eric Upton, include Hope Brighton, Brenda Vossler, Katie Leitch, Greg Gust and Kathleen Donahue

B.5.1.3 Community Coffee Focus Group Meetings Summary

Overview

The NDDES will conduct focus group meetings (Community Coffees) as a part of the strategy and tactics it will employ to achieve its goals for engaging underrepresented community groups and other stakeholders during the MOAP update process. Community Coffees are in-person or virtual small to medium size group meetings where target audiences are invited to come and sit down with project staff to address MOAP update project topics in an informal setting. In person meetings are generally held at informal community locations such as coffee shops or libraries. Virtual meetings are held using Microsoft Teams virtual meeting software. The MOAP update Technical Advisory Committee and Outreach Committee members will provide input on the target audiences for the Community Coffees and NDDES staff will partner with the relevant committee members and stakeholders to organize and hold the meetings. Additional details regarding the implementation of Community Coffee meetings are provided below.

- NDDES in collaboration with Atkins, TAC members, and Outreach Committee members will draft and deliver pre-scripted invitations to stakeholders and identified community groups to join in-person or virtual Community Coffees. These invitations are shared through email, social media, online postings, or direct communication.
- NDDES works with the TAC, Outreach Committee, and other partners to facilitate Community Coffees with the target audiences. This includes determining whether the activity should be in-person or virtual depending on the needs of the target audience and taking care of meeting logistics and materials.
- Community Coffee meetings are typically 1 – 1.5 hours in length and address topics including:
    - Introductions
    - Overview of MOAP update process and current project status
    - Discussion of hazard topics
    - Q&A and opportunity for additional feedback

Proposed Community Coffee Focus Group Meeting Frequency and Tracking

- Community Coffees will be held at least once a month during the MOAP update process.
- Target audiences for each Community Coffee will be selected in advance and meeting invitations will be sent out well in advance of meetings.
- Community Coffee meetings will be tracked in the MOAP update outreach activity schedule and tracking spreadsheet (MS Excel worksheet), which will be available to outreach committee members and outreach partners.

B.5.1.4 Outreach Strategy

OUTREACH STRATEGY

Enhanced Mitigation Mission Area Operations Plan

Ensuring a safe and secure homeland for all North Dakotans

Table of Contents

Background

In 2023, the State of North Dakota began the State of North Dakota Enhanced Mitigation Mission Area Operations Plan (MAOP) update process, in collaboration with Atkins North America (Atkins). The State will conduct early and continuous engagement with stakeholders and the public, and the plan update will be informed by and include their input.

The following sections detail the State of North Dakota's outreach and engagement goals and strategy. The intent of this strategy is to achieve meaningful stakeholder and public engagement that complies with FEMA's guidelines and regulations for enhanced hazard mitigation plans.

Outreach and Engagement Strategy and Tactics

The Enhanced Mitigation MAOP update outreach strategy will be achieved by utilizing the following six tactics to achieve the project's goals. The outreach and engagement goals for the Enhanced Mitigation MAOP update are to:

1) Invite interested parties to contribute their perspectives on hazard risks and ideas for mitigation
2) Inform and educate stakeholders and the public about North Dakota's hazards and risks
3) Provide and collect data that improves the quality, accuracy, and implementation of the plan
4) Ensure transparency and build relationships and trust
5) Identify and address conflicts early in the process
6) Reflect different perspectives and priorities throughout the process

Tactic 1 – Expand outreach targeting diverse and traditionally under-represented audiences in addition to critical partners.

The North Dakota Department of Emergency Services (NDDES) has well-established relationships with critical partners and stakeholders who were involved in the last Enhanced Mitigation MAOP update. For this update process the Technical Advisory Committee (TAC) and Outreach Committee has worked to identify audiences that did not actively participate in the last update process and will undertake outreach activities, such as the Community Coffee focus group meetings, to engage these groups. This includes community groups such as individuals experiencing homelessness, LGBQTIA+, students, non-English speakers, and other traditionally under-represented populations. A full list of target audiences is provided in Appendix A – "Contact List".

Tactic 2 – Engagement partnerships: coordinate with and build upon existing State, Tribal, local, and other entities' public engagement and outreach activities.

The North Dakota Department of Emergency Services (NDDES) and its Technical Advisory, Outreach, and Hazard Committee Partners currently engage with Enhanced Mitigation MAOP stakeholders and the public on a variety of topics through existing program and project work. The TAC and Outreach Committee members, in collaboration with Atkins, will:

1) Identify opportunities to leverage existing outreach efforts to share Enhanced Mitigation MAOP update project messaging and information.
2) Review the target audience list and add groups that have not historically been engaged and work to arrange focus group meetings (Community Coffees) with these groups or to share

project information and materials with them through committee members' existing channels (i.e., other program/project meetings).

3) Maintain a master contact list(s) for all audiences and host it on the NDDES Enhanced Mitigation MAOP Microsoft Teams site.
4) Briefly assess where challenges were identified with past outreach efforts and adjust as needed to improve their effectiveness (in terms of response and engagement). For example:
    a. Add social media promotion for surveys.
    b. Use geo-fencing social media capabilities to target specific audiences with outreach messaging.
    c. Develop a comprehensive outreach activity schedule and tracker for this project (see Tactic 6).

Tactic 3 – Develop consistent messaging and effective outreach materials that are available to all engagement partners and the public.

It is important to have outreach materials widely available to all parties that will be conducting outreach. Having concise messaging content for a project ensures that general project information can be easily and consistently conveyed.

The State of North Dakota DES, in collaboration with Atkins, will:

1) Use the existing project Microsoft Teams site to host project outreach materials in a location that is accessible to all parties that will be conducting outreach. Access to the project's Teams site will be provided to outreach committee members and other relevant parties.
2) Develop an elevator pitch for the project - short outreach messages that can be used by all parties when talking about the project. This may change as the project progresses, but consistency is beneficial.
3) Review existing outreach materials and ensure they are up-to-date and have consistent messaging.

Tactic 4 – Create an online hub dedicated to the project to share messaging, materials, and project information.

In a web search for "North Dakota Enhanced Mitigation Plan" or "North Dakota Enhanced Mitigation Plan Update," the search results take you to the NDDES "Mitigation Matters" webpage. While this is generally a great website, it is a broader agency website and does not instantly convey information regarding the plan or the plan update. The current state enhanced mitigation plan is accessible online at: Planning | Department of Emergency Services North Dakota (nd.gov). However, this can make it challenging for the public to easily learn about the plan and the plan update process.

The State of North Dakota DES, in collaboration with Atkins, will:

1) Create an online hub (website) for the project that focuses on the plan update. A suggested name for this website is "ND Hazards".
2) A link to this hub can be posted on the NDDES website and can be included in materials and social media posts.

3) Instead of a standard website Atkins can offer a virtual meeting space (using specialized software). This virtual meeting space is essentially a website designed to provide the audience with a 3D experience of walking into a community meeting room. The following types of information can be posted and shared in this virtual space:
    a. An elevator pitch – brief explanation of the project
    b. A project status dashboard
    c. Links to surveys
    d. Notices and links for public meetings (in-person and virtual)
    e. Draft project materials
    f. Project contact information

    The look of the virtual meeting space can be tailored to some extent (i.e., agency color and logo).

Tactic 5 – Direct stakeholder and public engagement activities including, but not limited to public meetings, focus group meetings, surveys, social media posts, newsletters, website postings, emails, and other activities.

Multiple approaches will be used to generate awareness and engage with stakeholders and the public during the Enhanced Mitigation MAOP update process. Focus group meetings will target a wide range of community groups including underserved and disadvantaged populations that have not always actively engaged with this process in the past. Project materials and messaging will be developed and distributed online, through social media postings, email communications, and newsletter articles. Project information, materials, and messaging will also be shared with stakeholders and the public through public, community group, and agency meetings. Feedback and input will also be gathered through surveys of local community staff, stakeholders, and the public. The TAC will oversee and coordinate these efforts with the assistance of Atkins staff. When the updated Enhanced Mitigation MAOP draft is released, it will be circulated to the target audiences including the Association of County Commissioners, League of Cities, Chambers of Commerce, etc.

Website and Social Media Postings, Email Communications, and Newsletters

Project messaging, materials, and status updates will be shared with interested parties, stakeholders, and the public through website and social media posts, email communications, and newsletter articles. NDDES publishes a bi-monthly newsletter that will have an article addressing this project in every issue. Email communications will be used to share project information with project committee members and other stakeholders, throughout the project. The materials developed for this project, project status updates, survey links, and public meeting advertisements will be posted online on the project website addressed under Tactic 4. Pre-scripted project messages and links to information available online will be posted on social media in advance of public meetings, project milestones, when the project surveys are sent out, and when new information is made available online.

Public, Community Group, and Agency Meetings

Engaging with stakeholders, the plan update project team, and the public through virtual and in-person meetings is a highly effective approach for gathering meaningful feedback. It is important to broadly advertise these meetings and sign them to concisely share information with the target audiences. The goal is for the audience to come away with a feeling of being heard (the feeling that their views and

concerns are being listened to). Developing a schedule for these meetings throughout the life of the project will help ensure they are well planned and advertised.

The State of North Dakota DES, in collaboration with Atkins, will:

1) Hold an in-person public meeting on the evening of **June 21, 2023**
    a. An evening public meeting in Bismarck.
    b. The target location is a local library.
2) Hold a virtual public meeting in the week(s) after the in-person public meeting.
3) Hold an in-person public meeting when the draft plan is released and available for public review and feedback.
4) Hold a virtual public meeting with office hours when the draft plan is available for feedback from the public.
5) Continue to hold smaller community focus group meetings (Community Coffees) with targeted audiences. These will occur monthly.
6) Develop a schedule and tracker for all planned meetings.

Surveys

Surveys are an important and effective way to get feedback from targeted audiences. The NDDES conducted surveys during the last plan update and has identified the need to take actions to improve survey penetration and response rates. NDDES will utilize Microsoft Forms software to develop surveys for this project.

The State of North Dakota DES, in collaboration with Atkins, will:

1) Conduct a public survey during the Risk Assessment review stage of the process and incorporate the climate change questions **(target release date: June 5, 2023):**
    a. Target audience: all interested parties
    b. Use Microsoft Forms for the survey.
    c. Promote it on social media.
    d. Tailor the survey to invite and encourage personal engagement and the sharing of personal stories and views related to hazard risks and past events.
2) Conduct a survey of local emergency managers, floodplain managers, and other relevant local staff **(target release date: June 5, 2023)**:
    a. Focus on target audience: local emergency managers, floodplain managers, wildfire specialists, land-use planners, and other local staff.
    b. Use Microsoft Forms for the survey.
    c. Promote it on social media.
    d. Focus on:
        i. Outreach approaches that work in their communities
        ii. Local hazard outreach success stories
        iii. Integration: Local engagement with DES staff and use of enhanced state mitigation plan when developing local plans and policies.
        iv. Local hazard planning activities and level of involvement

Tactic 6 – Track and Document Outreach Activities

FEMA requires documentation to show the outreach done for hazard mitigation plan development processes. Develop tracking and coordination tools to track project outreach done by the North Dakota Department of Emergency Services (NDDES) and partner organizations to more easily document and receive credit for outreach activities.

The State of North Dakota DES, in collaboration with Atkins will:

1) Develop an outreach activity schedule and tracker (i.e., Microsoft Excel workbook) that reflects the project's outreach schedule and can be used to document all outreach activities. A draft of the outreach activity schedule and tracker is provided in Appendix B – "Enhanced Mitigation MAOP Outreach Activity Schedule and Tracker".
2) Post the outreach schedule and tracker on the project's Microsoft Team site and make it accessible to all parties that will be conducting outreach efforts.

Identified Partners

The outreach partners identified are listed in the "2023 Committees – Enhanced Mitigation MAOP Team Members" spreadsheet (see Appendix C) and includes those listed on the TAC and the Outreach Committee.

Focus Group Approach Overview

A written summary of the State's approach to conducting Community Coffee focus groups is provided in Appendix D.

B.4.2 Public Survey and Public Survey Results

Public Survey for ND State Enhanced Mitigation Plan

Community members are encouraged to share their experiences, knowledge, and concerns about local and tribal hazards by participating in this public survey.

* Required

Disaster Concerns and Preparedness

1. In which community do you live?

2. In general, do you think disaster events or severe storms could have a major impact on your community in the future?

- ◯ Yes
- ◯ No
- ◯ Unsure

3. Please select the top 4 hazards you think are the biggest threat to your area. *

Please select at most 4 options.

- [ ] Dam Failure
- [ ] Drought
- [ ] Earthquake
- [ ] Extreme Heat
- [ ] Extreme Winter Storm Events (Ice or Snow Storm)
- [ ] Flood
- [ ] Hail
- [ ] Hazardous Material Event (Chemical Spill)
- [ ] Landslide
- [ ] Tornados
- [ ] Transportation Disaster (Road or Rail Crash)
- [ ] Wildfire
- [ ] Windstorm / High Wind Events
- [ ] Other

4. Are you worried about any potential disaster events that we did not list?

5. How worried are you about the possibility of your community being impacted by a disaster?

- ◯ Very worried
- ◯ Somewhat worried
- ◯ Only a little bit worried
- ◯ Not worried at all

6. On a scale of 1-10, how prepared do you feel for a disaster? (10=very, 1=not at all)

☆ ☆ ☆ ☆ ☆ ☆ ☆ ☆ ☆ ☆

7. Check all that apply: "I am worried about a disaster event..."

- [ ] causing damage to where I live
- [ ] causing damage to my business
- [ ] causing damage to my property
- [ ] impacting roads, bridges, and buildings in my community
- [ ] harming people I care about
- [ ] costing me money (missed work or injuries)
- [ ] Other

8. When severe weather or other dangerous events happen, are there areas of your community you worry about?
(Examples may include: certain access roads, intersections, bridges, levees or other infrastructure; important buildings like hospitals, fire stations, or community centers; or specific populations like young children or the elderly.)

9. Have you or anyone in your household experienced any disasters or severe storm events?
(Data will remain anonymous and only used for planning purposes.)

- ◯ Yes
- ◯ No

10. If yes, please share your story with us. You can describe the disaster or severe event you experienced and include details such as the type of event, when it happened, where you saw damage, and how it impacted your life.
(Data will remain anonymous and only used for planning purposes)

11. What steps should the government take to reduce risks in your area? (Check all that apply.)

- [ ] Alert/warning system
- [ ] Shelters: Emergency or Storm shelters
- [ ] Debris/tree removal
- [ ] Build/improve flood protection
- [ ] Keep or expand open spaces & natural areas
- [ ] Improve water quality
- [ ] Maintain/improve public roads, bridges, other transportation features
- [ ] Protect natural resources
- [ ] More emergency services
- [ ] Public education and outreach
- [ ] Other

12. This is a list of risk-reduction activities. Tell us about your interest in each of these activities.
(If viewing on a mobile device, you may need to scroll to the right to see all the response option columns.)

	Done this	Plan to do in the future	Thinking about doing this	Can't do this	Won't do this
Attend information meetings on natural disasters	○	○	○	○	○
Make a household emergency plan	○	○	○	○	○
Prepare a home supply kit, "go bag" or store supplies	○	○	○	○	○
Create a buffer around your home to protect against wildfire	○	○	○	○	○
Purchase hazard insurance (flood, earthquake, etc.)	○	○	○	○	○
Make a disaster plan with your neighbors (phone tree, home checks, etc.)	○	○	○	○	○
Protect and strengthen your home or					

13. What additional actions do you plan to take to reduce the risk to your home or business from natural hazards (example: floods, earthquakes, winter storms)?

14. Do you have any suggestions for how the state can engage with more diverse and under-represented groups and individuals? Are there any specific groups you think the state should engage with?

15. How do you normally get information about a disaster in your area?

- [ ] Friends, family, word of mouth
- [ ] TV
- [ ] Radio
- [ ] Newspaper
- [ ] Websites - local government pages
- [ ] Websites - private
- [ ] Social Media (Facebook, Twitter, Instagram, etc)
- [ ] Text messages
- [ ] Emergency alert subscriptions
- [ ] Other

16. Are there any other comments or stories you would like to share with us about hazards?

Contact

Thank you for your participation. Please click SUBMIT to complete the survey.
For questions regarding this survey or for more information about the State of North Dakota's disaster planning efforts, please contact Hope Brighton at hopebrighton@nd.gov.

Public Survey for ND State Enhanced Mitigation Plan

260	12:20	Closed
Responses	Average time to complete	Status

1. In which community do you live?

More Details Insights

256
Responses

Latest Responses
"Bismarck"
"Bismarck, ND"
"Bismarck"

Update

68 respondents (**29**%) answered **Bismarck** for this question.

2. In general, do you think disaster events or severe storms could have a major impact on your community in the future?

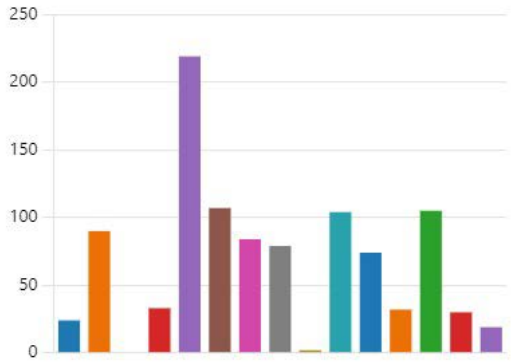
More Details

Yes	223
No	19
Unsure	13

3. Please select the top 4 hazards you think are the biggest threat to your area.

More Details

Dam Failure	24
Drought	90
Earthquake	0
Extreme Heat	33
Extreme Winter Storm Events (Ic...	219
Flood	107
Hail	84
Hazardous Material Event (Che...	79
Landslide	2
Tornados	104
Transportation Disaster (Road or...	74
Wildfire	32
Windstorm / High Wind Events	105
Infectious Disease	30
Other	19



4. Are you worried about any potential disaster events that we did not list?

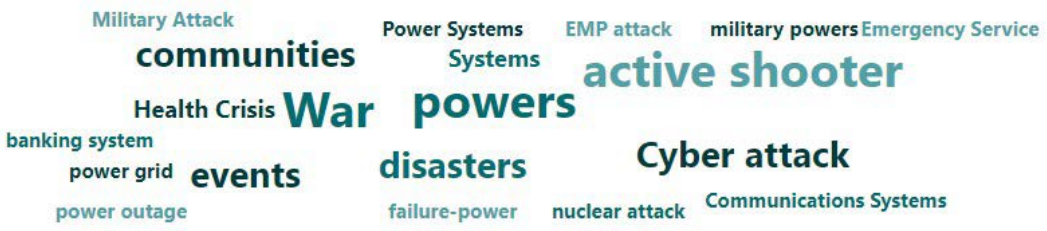
More Details Insights

159
Responses

Latest Responses
"radiation/nuclear "
"No"

Update

4 respondents (**3**%) answered **powers** for this question.



5. How worried are you about the possibility of your community being impacted by a disaster?

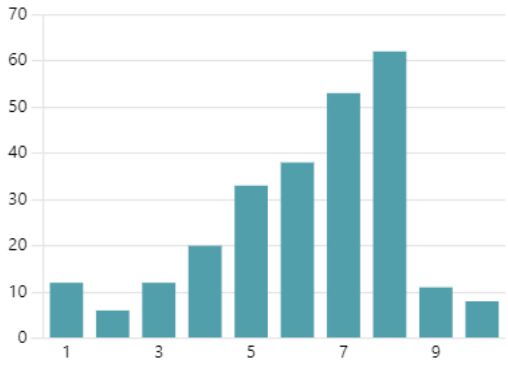
More Details

Very worried	20
Somewhat worried	119
Only a little bit worried	90
Not worried at all	29

6. On a scale of 1-10, how prepared do you feel for a disaster? (10=very, 1=not at all)

More Details Insights

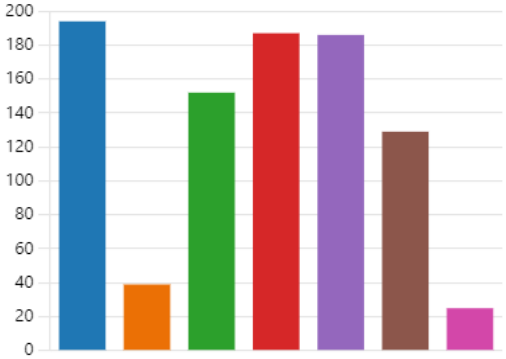
6.19
Average Rating



7. Check all that apply: "I am worried about a disaster event..."

More Details

causing damage to where I live	194
causing damage to my business	39
causing damage to my property	152
impacting roads, bridges, and b...	187
harming people I care about	186
costing me money (missed work...	129
Other	25



8. When severe weather or other dangerous events happen, are there areas of your community you worry about?
(Examples may include: certain access roads, intersections, bridges, levees or other infrastructure; important buildings like hospitals, fire stations, or community centers; or specific populations like young children or the elderly.)

More Details Insights

192
Responses

Latest Responses

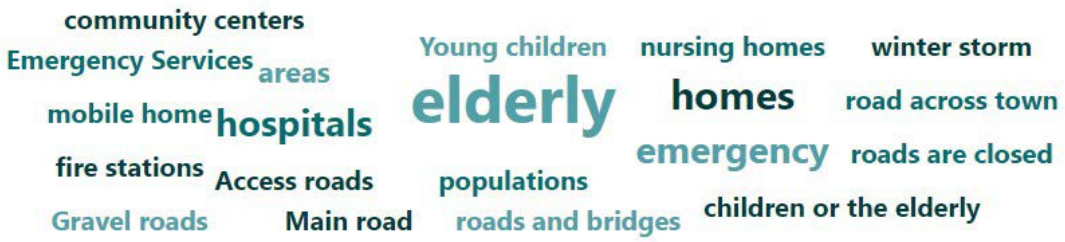
"Access to shelters. It would also be helpful to have public outreach and educ..."

"Hospitals and long-term care facilities, homeless shelters, childcare facilities "

"Roads hospitals infrastructure peoplepoluce fire"

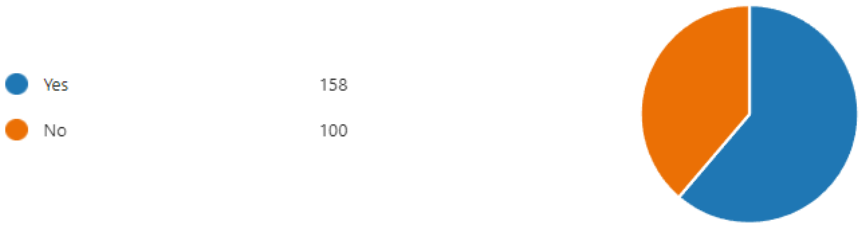
Update

26 respondents (**15**%) answered **elderly** for this question.



9. Have you or anyone in your household experienced any disasters or severe storm events?
(Data will remain anonymous and only used for planning purposes.)

More Details



10. If yes, please share your story with us. You can describe the disaster or severe event you experienced and include details such as the type of event, when it happened, where you saw damage, and how it impacted your life.
(Data will remain anonymous and only used for planning purposes)

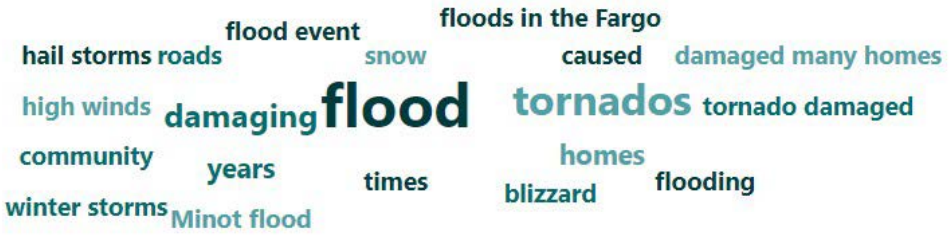
More Details Insights

137
Responses

Latest Responses
"Homeownership is not without its emergencies. A few years ago, as a new h..."
"Floods"

Update

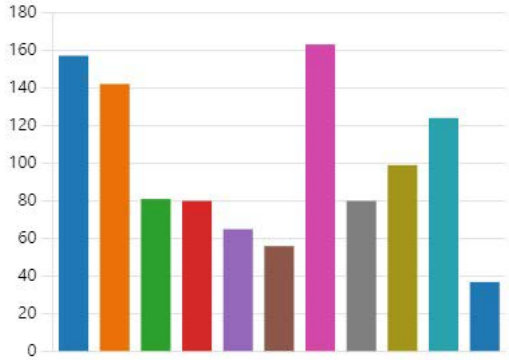
39 respondents (**31**%) answered **flood** for this question.



11. What steps should the government take to reduce risks in your area? (Check all that apply.)

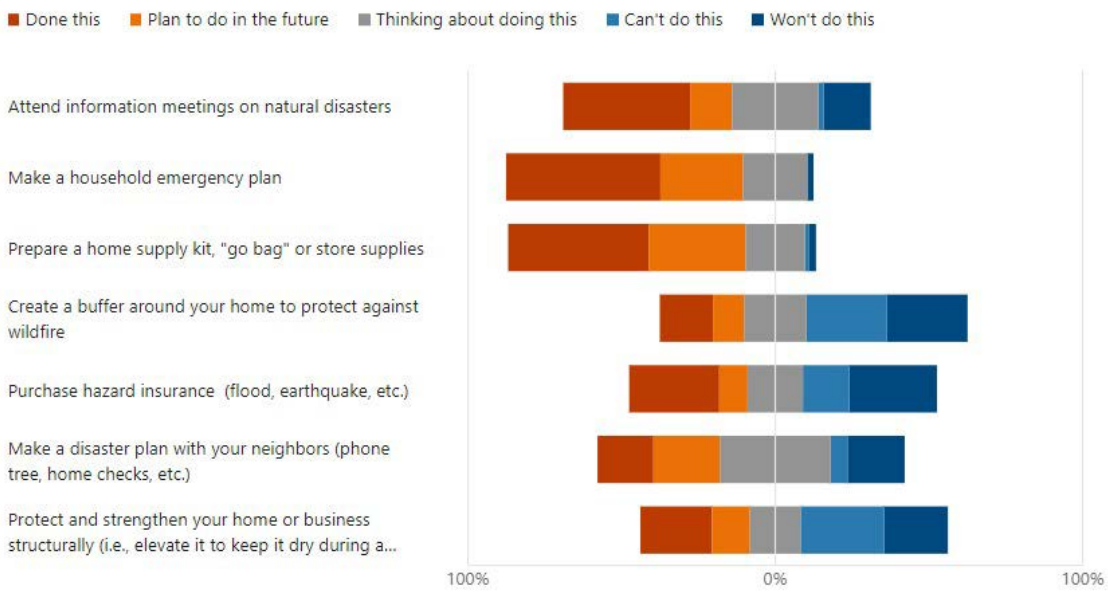
More Details

Alert/warning system	157
Shelters: Emergency or Storm sh...	142
Debris/tree removal	81
Build/improve flood protection	80
Keep or expand open spaces & ...	65
Improve water quality	56
Maintain/improve public roads, ...	163
Protect natural resources	80
More emergency services	99
Public education and outreach	124
Other	37



12. This is a list of risk-reduction activities. Tell us about your interest in each of these activities.
(If viewing on a mobile device, you may need to scroll to the right to see all the response option columns.)

More Details



13. What additional actions do you plan to take to reduce the risk to your home or business from natural hazards (example: floods, earthquakes, winter storms)?

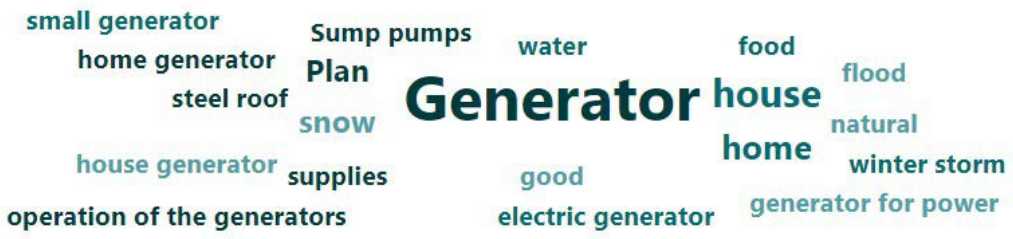
More Details Insights

123
Responses

Latest Responses

Update

16 respondents (**14**%) answered **Generator** for this question.



14. Do you have any suggestions for how the state can engage with more diverse and under-represented groups and individuals? Are there any specific groups you think the state should engage with?

More Details Insights

114
Responses

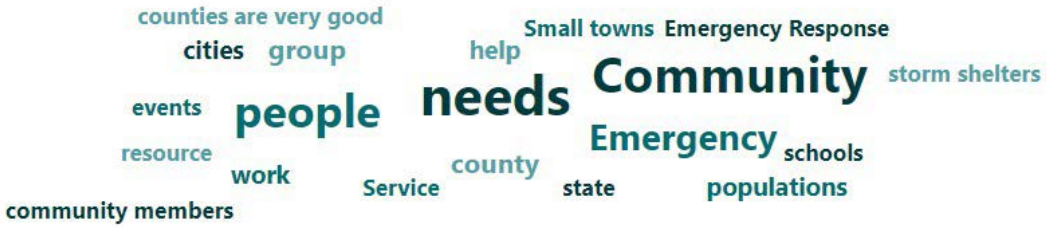
Latest Responses

"Use the NextDoor app to promote emergency preparedness and mitigation....

"Be more involved in the community, face to face, not only in ads and camp...

Update

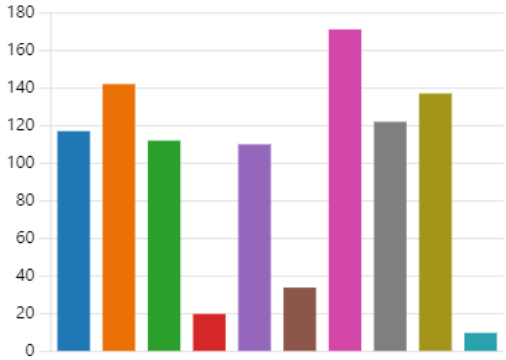
15 respondents (**15**%) answered **needs** for this question.



15. How do you normally get information about a disaster in your area?

More Details

Friends, family, word of mouth	117
TV	142
Radio	112
Newspaper	20
Websites - local government pa...	110
Websites - private	34
Social Media (Facebook, Twitter,...	171
Text messages	122
Emergency alert subscriptions	137
Other	10



16. Are there any other comments or stories you would like to share with us about hazards?

More Details Insights

56
Responses

Latest Responses

Update

27 respondents (**53**%) answered **no** for this question.

ID	Start time	Completion time	Email	In which community do you live?	In general, do you think disaster events or severe storms could have a major impact on your community in the future?	Please select the top 4 hazards you think are the biggest threat to your area.	Are you worried about any potential disaster events that we did not list?	How worried are you about the possibility of your community being impacted by a disaster?	On a scale of 1-10, how prepared do you feel for a disaster? (10=very, 1=not at all)	Check all that apply: "I am worried about a disaster event..."
1	6/12/23 8:04:52	6/12/23 8:24:00	anonymous	Mandan, ND	Yes	Cyberattack; Hazardous Material Event (Chemical Spill);Drought; Extreme Winter Storm Events (Ice or Snow Storm);	Mental Health Crisis (i.e., active shooter, addiction, increased domestic violence)	Very worried	4	impacting roads, bridges, and buildings in my community; harming people I care about; costing me money (missed work or injuries);
2	6/21/23 7:11:29	6/21/23 7:16:16	anonymous	Bismarck	Yes	Flood;Hail;Hazardous Material Event (Chemical Spill);Tornados;	pipelines	Only a little bit worried	7	causing damage to where I live;
3	6/21/23 16:18:34	6/21/23 16:29:09	anonymous	Mandan	Yes	Flood;Windstorm / High Wind Events;Extreme Winter Storm Events (Ice or Snow Storm);Hail;	Pipeline protest	Only a little bit worried	3	causing damage to where I live;impacting roads, bridges, and buildings in my community;
4	6/23/23 12:57:02	6/23/23 12:59:56	anonymous	Bismarck	Yes	Dam Failure;Extreme Winter Storm Events (Ice or Snow Storm);Flood;Windstorm / High Wind Events;	Wildfire smoke	Only a little bit worried	6	causing damage to where I live;causing damage to my property;impacting roads, bridges, and buildings in my community;harming people I care about;costing me money (missed work or injuries);
5	6/23/23 17:15:48	6/23/23 17:22:14	anonymous	Burleigh County	Yes	Extreme Winter Storm Events (Ice or Snow Storm);Tornados;Wildfire;Hail;		Only a little bit worried	7	causing damage to where I live;causing damage to my property;impacting roads, bridges, and buildings in my community;harming people I care about;costing me money (missed work or injuries);
6	6/24/23 17:18:06	6/24/23 17:27:45	anonymous	Keene	Yes	Wildfire;Tornados;Extreme Heat;Search and rescue, missing persons;	Outdoor incidents, public lands/lake	Very worried	9	causing damage to where I live;causing damage to my business;causing damage to my property;impacting roads, bridges, and buildings in my community;harming people I care about;costing me money (missed work or injuries);Government agencies not being prepared ;
7	7/6/23 8:51:20	7/6/23 9:06:03	anonymous	Bismarck	Yes	Flood;Windstorm / High Wind Events;Extreme Winter Storm Events (Ice or Snow Storm);Hail;	Yellowstone caldera eruption	Only a little bit worried	7	impacting roads, bridges, and buildings in my community;harming people I care about;costing me money (missed work or injuries);causing damage to where I live;causing damage to my property;
8	7/6/23 11:20:57	7/6/23 11:29:17	anonymous	Palermo	Yes	Extreme Winter Storm Events (Ice or Snow Storm);Tornados;summer storms;Transportation Disaster (Road or Rail Crash) ;		Very worried	8	causing damage to my property;impacting roads, bridges, and buildings in my community;
9	7/6/23 11:43:47	7/6/23 11:46:33	anonymous	New Town/Stanley	Yes	Drought;Extreme Winter Storm Events (Ice or Snow Storm);Hail;Tornados;		Somewhat worried	8	causing damage to where I live;causing damage to my business;causing damage to my property;impacting roads, bridges, and buildings in my community;harming people I care about;costing me money (missed work or injuries);
10	7/6/23 11:46:19	7/6/23 11:50:32	anonymous	Bismarck	Yes	Extreme Winter Storm Events (Ice or Snow Storm);Transportation Disaster (Road or Rail Crash) ;	No	Only a little bit worried	8	harming people I care about;impacting roads, bridges, and buildings in my community;
11	7/6/23 11:46:42	7/6/23 11:51:50	anonymous	Powers Lake	Yes	Drought;Tornados;Wildfire;Windstorm / High Wind Events;		Somewhat worried	7	harming people I care about;
12	7/6/23 11:52:00	7/6/23 12:04:49	anonymous	Grafton	Yes	Extreme Winter Storm Events (Ice or Snow Storm);Hail;Windstorm / High Wind Events;Transportation Disaster (Road or Rail Crash) ;		Only a little bit worried	8	impacting roads, bridges, and buildings in my community;
13	7/6/23 12:33:49	7/6/23 12:40:19	anonymous	Barnes	Yes	Flood;Extreme Winter Storm Events (Ice or Snow Storm);Windstorm / High Wind Events;Drought;	NO	Somewhat worried	7	harming people I care about;impacting roads, bridges, and buildings in my community;causing damage to where I live;
14	7/6/23 17:00:17	7/6/23 17:03:45	anonymous	Palermo	Yes	Extreme Winter Storm Events (Ice or Snow Storm);Hazardous Material Event (Chemical Spill);Transportation Disaster (Road or Rail Crash) ;Windstorm / High Wind Events;		Very worried	1	causing damage to where I live;causing damage to my property;impacting roads, bridges, and buildings in my community;costing me money (missed work or injuries);
15	7/7/23 6:52:53	7/7/23 6:57:24	anonymous	New Town	Yes	Drought;Extreme Winter Storm Events (Ice or Snow Storm);Hail;Transportation Disaster (Road or Rail Crash) ;	no	Somewhat worried	8	affecting water, electricity, heat services.;
16	7/8/23 21:33:00	7/8/23 23:47:40	anonymous	Stanley	Yes	Extreme Winter Storm Events (Ice or Snow Storm);Transportation Disaster (Road or Rail Crash) ;Windstorm / High Wind Events;Hail;	Political/Military Situations, I feel that there once again needs to be planning for a possible Military Attack, Nuclear &/or EMP. Therefore, I feel that Public Shelters, like we had during the Cold War, need to be reestablished. These shelters could also be used for weather events. Now that most major military powers have EMP Weapons, our communities need to be protected from such weapons, by hardening current &/or creating Emergency Communications Systems & Power Systems. Communities, should do, as many Ham [Amateur] Radio Emergency Service Members have done. They have backup Transceivers & Emergency [Solar & Battery] Power Systems stored in Metal Cabinet Faraday Cages. In this way, Hams will be able to operate, even after an EMP attack, when most other	Somewhat worried	7	causing damage to where I live;causing damage to my property;harming people I care about;impacting roads, bridges, and buildings in my community;
17	7/10/23 8:10:26	7/10/23 8:16:15	anonymous	SE Barnes County	Yes	Extreme Winter Storm Events (Ice or Snow Storm);Flood;Hazardous Material Event (Chemical Spill);Windstorm / High Wind Events;		Somewhat worried		causing damage to my property;impacting roads, bridges, and buildings in my community;harming people I care about;costing me money (missed work or injuries);causing damage to where I live;
18	7/11/23 4:55:10	7/11/23 9:46:56	anonymous	Bismarck	Unsure	Extreme Winter Storm Events (Ice or Snow Storm);Hail;Hazardous Material Event (Chemical Spill);Wildfire;		Somewhat worried	9	causing damage to my property;harming people I care about;

ID	Start time	Completion time	Email	In which community do you live?	In general, do you think disaster events or severe storms could have a major impact on your community in the future?	Please select the top 4 hazards you think are the biggest threat to your area.	Are you worried about any potential disaster events that we did not list?	How worried are you about the possibility of your community being impacted by a disaster?	On a scale of 1-10, how prepared do you feel for a disaster? (10=very, 1=not at all)	Check all that apply: "I am worried about a disaster event..."
19	7/11/23 19:20:09	7/11/23 19:24:26	anonymous	Stanley	Yes	Extreme Winter Storm Events (Ice or Snow Storm);Hail;Transportation Disaster (Road or Rail Crash) ;Tornados;	No	Only a little bit worried	5	causing damage to where I live;causing damage to my property;impacting roads, bridges, and buildings in my community;harming people I care about;costing me money (missed work or injuries);
20	7/12/23 7:18:07	7/12/23 7:28:28	anonymous	Williston	Yes	Drought;Extreme Winter Storm Events (Ice or Snow Storm);Hazardous Material Event (Chemical Spill);Tornados;	No	Somewhat worried	5	causing damage to where I live;causing damage to my business;causing damage to my property;impacting roads, bridges, and buildings in my community;harming people I care about;costing me money (missed work or injuries);
21	7/12/23 8:27:12	7/12/23 8:29:31	anonymous	Nelson county	Yes	Extreme Winter Storm Events (Ice or Snow Storm);Transportation Disaster (Road or Rail Crash) ;Windstorm / High Wind Events;Flood;		Somewhat worried	5	causing damage to where I live;harming people I care about;costing me money (missed work or injuries);impacting roads, bridges, and buildings in my community;causing damage to my property;
22	7/12/23 8:50:44	7/12/23 8:58:08	anonymous	Williston ND	Yes	Extreme Heat;Extreme Winter Storm Events (Ice or Snow Storm);Transportation Disaster (Road or Rail Crash) ;Windstorm / High Wind Events;	No	Only a little bit worried	8	causing damage to where I live;causing damage to my property;costing me money (missed work or injuries);Loosing power for extended periods of time. We don't have another option for alternative heating of our home.;
23	7/12/23 8:54:36	7/12/23 9:11:04	anonymous	Adams County/Reeder	Yes	Extreme Winter Storm Events (Ice or Snow Storm);Hazardous Material Event (Chemical Spill);Transportation Disaster (Road or Rail Crash) ;Wildfire;	None	Somewhat worried	4	causing damage to where I live;impacting roads, bridges, and buildings in my community;harming people I care about;
24	7/12/23 9:53:36	7/12/23 10:05:27	anonymous	Watford City	Yes	Extreme Winter Storm Events (Ice or Snow Storm);Tornados;Windstorm / High Wind Events;	No	Only a little bit worried	1	causing damage to where I live;causing damage to my property;impacting roads, bridges, and buildings in my community;harming people I care about;costing me money (missed work or injuries);
25	7/12/23 18:12:26	7/12/23 18:15:16	anonymous	Minot	Yes	Extreme Winter Storm Events (Ice or Snow Storm);Flood;Hazardous Material Event (Chemical Spill);Transportation Disaster (Road or Rail Crash) ;	No	Somewhat worried	6	harming people I care about;
26	7/13/23 0:28:27	7/13/23 0:38:09	anonymous	West fargo	Unsure	Drought;Extreme Winter Storm Events (Ice or Snow Storm);Flood;Tornados;	No	Not worried at all	3	causing damage to where I live;
27	7/13/23 1:42:50	7/13/23 1:58:48	anonymous	Mercer	Yes	Extreme Winter Storm Events (Ice or Snow Storm);Extreme Heat;Tornados;Windstorm / High Wind Events;	No	Somewhat worried	7	causing damage to where I live;causing damage to my property;impacting roads, bridges, and buildings in my community;costing me money (missed work or injuries);
28	7/13/23 3:48:54	7/13/23 4:00:52	anonymous	Belfield, ND (Rual)	Yes	Drought;Extreme Winter Storm Events (Ice or Snow Storm);Hail;Wildfire;	No		5	causing damage to where I live;causing damage to my property;harming people I care about;
29	7/15/23 18:06:00	7/15/23 18:10:33	anonymous	Rugby	Yes	Extreme Winter Storm Events (Ice or Snow Storm);Tornados;Transportation Disaster (Road or Rail Crash) ;		Somewhat worried	8	causing damage to where I live;causing damage to my property;impacting roads, bridges, and buildings in my community;harming people I care about;costing me money (missed work or injuries);
30	7/15/23 20:15:22	7/15/23 20:19:17	anonymous	Bismarck	Yes	Extreme Winter Storm Events (Ice or Snow Storm);Windstorm / High Wind Events;Tornados;Transportation Disaster (Road or Rail Crash) ;	No	Not worried at all	8	causing damage to my property;harming people I care about;costing me money (missed work or injuries);
31	7/16/23 10:10:38	7/16/23 10:23:44	anonymous	cartwright	No	Extreme Winter Storm Events (Ice or Snow Storm);Wildfire;Hail;Transportation Disaster (Road or Rail Crash) ;	no	Only a little bit worried	9	causing damage to where I live;impacting roads, bridges, and buildings in my community;
32	7/16/23 15:17:57	7/16/23 15:26:07	anonymous	Bottineau	No	Drought;Extreme Winter Storm Events (Ice or Snow Storm);Hazardous Material Event (Chemical Spill);Windstorm / High Wind Events;	No	Only a little bit worried	8	causing damage to where I live;impacting roads, bridges, and buildings in my community;
33	7/17/23 8:25:17	7/17/23 8:28:17	anonymous	Minot	Yes	Transportation Disaster (Road or Rail Crash) ;Hazardous Material Event (Chemical Spill);Windstorm / High Wind Events;Extreme Winter Storm Events (Ice or Snow Storm);	No	Only a little bit worried	4	causing damage to where I live;causing damage to my property;impacting roads, bridges, and buildings in my community;costing me money (missed work or injuries);
34	7/18/23 17:04:27	7/18/23 17:12:16	anonymous	Mandan ND	Yes	Extreme Heat;Tornados;Hail;Windstorm / High Wind Events;	No	Somewhat worried	7	causing damage to where I live;causing damage to my property;harming people I care about;
35	7/20/23 10:43:56	7/20/23 10:52:11	anonymous	Fargo	Yes	Extreme Winter Storm Events (Ice or Snow Storm);Flood;Transportation Disaster (Road or Rail Crash) ;Drought;	Infectious disease	Very worried	7	causing damage to where I live;impacting roads, bridges, and buildings in my community;harming people I care about;costing me money (missed work or injuries);
36	7/27/23 9:01:47	7/27/23 9:16:55	anonymous	West Fargo	Yes	Tornados;Flood;Extreme Winter Storm Events (Ice or Snow Storm);Windstorm / High Wind Events;	I tend to think of disasters broadly and believe that we need to mitigate the social factors that make some of community members more vulnerable to disaster impacts regardless of hazard agent	Very worried	8	causing damage to where I live;impacting roads, bridges, and buildings in my community;harming people I care about;costing me money (missed work or injuries);Differential impacts which would widen current economic and social inequities;
37	7/27/23 12:45:28	7/27/23 13:04:09	anonymous	Dickinson	Yes	Extreme Winter Storm Events (Ice or Snow Storm);Hazardous Material Event (Chemical Spill);Transportation Disaster (Road or Rail Crash) ;Tornados;	No	Not worried at all	7	impacting roads, bridges, and buildings in my community;causing damage to where I live;
38	7/31/23 5:41:48	7/31/23 5:49:21	anonymous	Fargo/Moorhead	Yes	Tornados;Extreme Winter Storm Events (Ice or Snow Storm);		Somewhat worried	7	impacting roads, bridges, and buildings in my community;causing damage to my business;causing damage to where I live;costing me money (missed work or injuries);
39	8/1/23 5:55:29	8/1/23 5:59:55	anonymous	Valley City	Yes	Flood;Extreme Winter Storm Events (Ice or Snow Storm);Hazardous Material Event (Chemical Spill);Transportation Disaster (Road or Rail Crash) ;	Man-made	Only a little bit worried	6	causing damage to where I live;impacting roads, bridges, and buildings in my community;harming people I care about;
40	8/3/23 18:17:15	8/3/23 18:25:50	anonymous	Bismarck	Yes	Extreme Winter Storm Events (Ice or Snow Storm);Hail;Hazardous Material Event (Chemical Spill);Windstorm / High Wind Events;	Cyber attack, terrorism nuclear attack	Somewhat worried	6	causing damage to where I live;causing damage to my business;causing damage to my property;impacting roads, bridges, and buildings in my community;harming people I care about;costing me money (missed work or injuries);That starts a snowball effect ;

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41	8/8/23 12:03:43	8/8/23 12:09:16	anonymous	Mandan	Yes	Extreme Winter Storm Events (Ice or Snow Storm);Flood;Windstorm / High Wind Events;Hazardous Material Event (Chemical Spill);	Protest activities	Somewhat worried	8	causing damage to where I live;causing damage to my property;impacting roads, bridges, and buildings in my community;costing me money (missed work or injuries);harming people I care about;
42	8/8/23 12:08:37	8/8/23 12:21:40	anonymous	Mandan	Yes	Extreme Winter Storm Events (Ice or Snow Storm);Hail;Tornados;Windstorm / High Wind Events;	A Disaster Event at the Refinery	Somewhat worried	7	causing damage to where I live;harming people I care about;causing damage to my property;impacting roads, bridges, and buildings in my community;costing me money (missed work or injuries);
43	8/8/23 12:10:30	8/8/23 12:30:02	anonymous	Morton County / Mandan	Yes	Extreme Winter Storm Events (Ice or Snow Storm);Flood;Transportation Disaster (Road or Rail Crash) ;Tornados;	Refinery explosion	Only a little bit worried	8	causing damage to where I live;causing damage to my property;impacting roads, bridges, and buildings in my community;harming people I care about;costing me money (missed work or injuries);
44	8/18/23 17:57:20	8/18/23 18:04:05	anonymous	Mapleton ND	Yes	Drought;Extreme Heat;Extreme Winter Storm Events (Ice or Snow Storm);Windstorm / High Wind Events;		Somewhat worried	4	impacting roads, bridges, and buildings in my community;
45	8/18/23 18:15:51	8/18/23 18:23:32	anonymous	Dickinson	No	Drought;Extreme Winter Storm Events (Ice or Snow Storm);Windstorm / High Wind Events;Hail;	No	Not worried at all	8	No;
46	8/19/23 7:14:31	8/19/23 7:22:30	anonymous	Dazey,ND	Yes	Dam Failure;Extreme Winter Storm Events (Ice or Snow Storm);Flood;Wildfire;		Very worried	8	causing damage to where I live;causing damage to my property;impacting roads, bridges, and buildings in my community;costing me money (missed work or injuries);
47	8/19/23 8:04:54	8/19/23 8:10:25	anonymous	Grand forks	Yes	Flood;Extreme Winter Storm Events (Ice or Snow Storm);Drought;Tornados;	Plague of locusts	Only a little bit worried	7	causing damage to where I live;causing damage to my property;harming people I care about;
48	8/19/23 9:51:24	8/19/23 9:57:30	anonymous	Bismarck	Yes	Extreme Winter Storm Events (Ice or Snow Storm);Government cutting off fossil fuels;Drought;	Government regulations negatively impacting food and energy producers	Only a little bit worried	5	Making life very difficult for everyone here;
49	8/19/23 11:03:35	8/19/23 11:10:15	anonymous	Lincoln	Yes	Drought;Extreme Heat;Extreme Winter Storm Events (Ice or Snow Storm);Hail;		Somewhat worried	5	causing damage to my property;causing damage to where I live;harming people I care about;impacting roads, bridges, and buildings in my community;
50	8/19/23 11:48:26	8/19/23 12:27:23	anonymous	Fargo	Yes	Hazardous Material Event (Chemical Spill);Tornados;Windstorm / High Wind Events;Extreme Winter Storm Events (Ice or Snow Storm);		Not worried at all	8	harming people I care about;
51	8/19/23 13:52:02	8/19/23 14:03:32	anonymous	Burleigh Bismarck	Yes	Wildfire;Hazardous Material Event (Chemical Spill);Tornados;Extreme Winter Storm Events (Ice or Snow Storm);	I wanted to check more than 4	Somewhat worried	4	causing damage to where I live;causing damage to my property;impacting roads, bridges, and buildings in my community;harming people I care about;
52	8/19/23 17:05:51	8/19/23 17:21:03	anonymous	Mandan	Yes	Extreme Winter Storm Events (Ice or Snow Storm);Flood;Extended power outage ;Transportation Disaster (Road or Rail Crash) ;	An event similar to a carrington event from the sun	Somewhat worried	4	causing damage to where I live;causing damage to my property;costing me money (missed work or injuries);
53	8/19/23 17:48:33	8/19/23 17:53:27	anonymous	Bismarck	Yes	Dam Failure;Extreme Winter Storm Events (Ice or Snow Storm);Hazardous Material Event (Chemical Spill);Grid failure, wmd attacks;	Grid failure, wmd attacks	Only a little bit worried	6	harming people I care about;causing damage to where I live;impacting roads, bridges, and buildings in my community;
54	8/19/23 18:59:15	8/19/23 19:04:46	anonymous	Bismarck	Yes	Drought;Extreme Winter Storm Events (Ice or Snow Storm);Flood;Hazardous Material Event (Chemical Spill);	Pipeline spill	Very worried	6	causing damage to where I live;impacting roads, bridges, and buildings in my community;harming people I care about;costing me money (missed work or injuries);Environmental threats;
55	8/19/23 19:25:49	8/19/23 19:36:56	anonymous	Belfield	Yes	Extreme Winter Storm Events (Ice or Snow Storm);Flood;Transportation Disaster (Road or Rail Crash) ;Windstorm / High Wind Events;		Only a little bit worried	7	causing damage to where I live;causing damage to my business;impacting roads, bridges, and buildings in my community;harming people I care about;
56	8/20/23 11:24:21	8/20/23 11:31:17	anonymous	Mees Country Estates, Burleigh County	Yes	Extreme Winter Storm Events (Ice or Snow Storm);Windstorm / High Wind Events;Wildfire;Flood;	People speeding in unfavorable conditions.	Somewhat worried	7	causing damage to my property;impacting roads, bridges, and buildings in my community;harming people I care about;costing me money (missed work or injuries);causing damage to where I live;
57	8/20/23 11:49:29	8/20/23 11:55:22	anonymous	Bismarck	No	Dam Failure;Flood;Tornados;Extreme Winter Storm Events (Ice or Snow Storm);	Nuclear war	Only a little bit worried	8	harming people I care about;
58	8/20/23 14:29:17	8/20/23 14:36:37	anonymous	Dickinson	Yes	Extreme Winter Storm Events (Ice or Snow Storm);Flood;Hail;Hazardous Material Event (Chemical Spill);		Somewhat worried	5	harming people I care about;
59	8/20/23 19:01:15	8/20/23 19:09:23	anonymous	Mandan	Yes	Flood;Hazardous Material Event (Chemical Spill);Transportation Disaster (Road or Rail Crash) ;Tornados;	Yellowstone caldera super-eruption	Somewhat worried	4	causing damage to where I live;harming people I care about;costing me money (missed work or injuries);impacting roads, bridges, and buildings in my community;
60	8/20/23 22:21:38	8/20/23 22:28:56	anonymous	mandan	Yes	Hail;Tornados;Windstorm / High Wind Events;	no	Somewhat worried	10	causing damage to where I live;causing damage to my property;impacting roads, bridges, and buildings in my community;harming people I care about;
61	8/21/23 3:31:05	8/21/23 3:46:22	anonymous	Bismarck	Yes	Extreme Winter Storm Events (Ice or Snow Storm);Flood;Hazardous Material Event (Chemical Spill);Transportation Disaster (Road or Rail Crash) ;		Somewhat worried	6	causing damage to where I live;impacting roads, bridges, and buildings in my community;harming people I care about;
62	8/21/23 5:28:18	8/21/23 5:37:54	anonymous	Grand Forks	Yes	Drought;Extreme Heat;Flood;Wildfire;		Somewhat worried	7	harming people I care about;
63	8/21/23 7:05:15	8/21/23 7:16:00	anonymous	Grand Forks County	Yes	Drought;Extreme Winter Storm Events (Ice or Snow Storm);Transportation Disaster (Road or Rail Crash) ;Tornados;	Government over reach	Only a little bit worried	7	causing damage to where I live;harming people I care about;causing damage to my property;impacting roads, bridges, and buildings in my community;costing me money (missed work or injuries);

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64	8/21/23 10:37:40	8/21/23 10:50:56	anonymous	Grant...burleigh	Yes	Hazardous Material Event (Chemical Spill);Tornados;Billionaire politicians;	Politics... carbon capture eminent domain threat of billionaire politicians	Somewhat worried	6	causing damage to my property;impacting roads, bridges, and buildings in my community;harming people I care about;
65	8/21/23 11:26:07	8/21/23 11:30:20	anonymous	Washburn	No	Hail;Tornados;Windstorm / High Wind Events;War;	War and our military bases	Only a little bit worried	1	harming people I care about;
66	8/21/23 11:36:18	8/21/23 11:45:00	anonymous	Page	Yes	Extreme Winter Storm Events (Ice or Snow Storm);Tornados;Transportation Disaster (Road or Rail Crash) ;Windstorm / High Wind Events;		Somewhat worried	7	impacting roads, bridges, and buildings in my community;causing damage to where I live;harming people I care about;causing damage to my property;
67	8/21/23 12:47:47	8/21/23 13:00:18	anonymous	Unincorporated Stark Co	Yes	Drought;Extreme Heat;Extreme Winter Storm Events (Ice or Snow Storm);Windstorm / High Wind Events;	No	Somewhat worried	8	causing damage to where I live;causing damage to my property;impacting roads, bridges, and buildings in my community;
68	8/21/23 13:37:10	8/21/23 13:42:34	anonymous	Mandan	Yes	Drought;Extreme Winter Storm Events (Ice or Snow Storm);Tornados;Government;		Only a little bit worried	8	causing damage to where I live;harming people I care about;costing me money (missed work or injuries);Impacting my freedom;
69	8/21/23 13:36:18	8/21/23 13:49:09	anonymous	Mandan, ND	Yes	Hail;Tornados;Transportation Disaster (Road or Rail Crash) ;Extreme Winter Storm Events (Ice or Snow Storm);	Major issues with transportation into and out of the community	Somewhat worried	6	causing damage to where I live;causing damage to my business;causing damage to my property;impacting roads, bridges, and buildings in my community;harming people I care about;costing me money (missed work or injuries);Causing issues with infrastructure ;
70	8/21/23 15:31:37	8/21/23 15:37:14	anonymous	Bismarck	Yes	Drought;Extreme Winter Storm Events (Ice or Snow Storm);Windstorm / High Wind Events;Hail;	Attack by foreign entities	Only a little bit worried	7	causing damage to where I live;impacting roads, bridges, and buildings in my community;harming people I care about;causing damage to my property;
71	8/21/23 16:56:38	8/21/23 17:04:31	anonymous	Bismarck	Yes	Drought;Extreme Winter Storm Events (Ice or Snow Storm);Landslide ;Hazardous Material Event (Chemical Spill);		Somewhat worried	5	impacting roads, bridges, and buildings in my community;causing damage to my property;
72	8/21/23 18:33:55	8/21/23 19:14:29	anonymous	Davenport	Yes	Hail;Tornados;Extreme Winter Storm Events (Ice or Snow Storm);Windstorm / High Wind Events;		Not worried at all	10	causing damage to where I live;causing damage to my property;impacting roads, bridges, and buildings in my community;costing me money (missed work or injuries);
73	8/21/23 19:49:00	8/21/23 19:53:47	anonymous	Dickinson	Yes	Extreme Winter Storm Events (Ice or Snow Storm);Tornados;Transportation Disaster (Road or Rail Crash) ;Hazardous Material Event (Chemical Spill);		Not worried at all	5	causing damage to where I live;causing damage to my property;impacting roads, bridges, and buildings in my community;harming people I care about;costing me money (missed work or injuries);
74	8/21/23 20:02:58	8/21/23 20:10:21	anonymous	Fargo	No	Extreme Winter Storm Events (Ice or Snow Storm);Windstorm / High Wind Events;Flood;Transportation Disaster (Road or Rail Crash) ;	Mass shooting/ bombing	Only a little bit worried	8	causing damage to where I live;harming people I care about;impacting roads, bridges, and buildings in my community;
75	8/22/23 4:03:38	8/22/23 5:01:03	anonymous	Rural Bismarck	Unsure	Hazardous Material Event (Chemical Spill);Hail;Windstorm / High Wind Events;Extreme Winter Storm Events (Ice or Snow Storm);	Electric grid reliability	Somewhat worried	7	causing damage to where I live;causing damage to my business;causing damage to my property;costing me money (missed work or injuries);harming people I care about;
76	8/22/23 6:41:58	8/22/23 6:50:40	anonymous	Bismarck	No	Flood;Hail;Hazardous Material Event (Chemical Spill);Tornados;	No	Only a little bit worried	7	causing damage to where I live;costing me money (missed work or injuries);harming people I care about;causing damage to my property;
77	8/22/23 10:21:46	8/22/23 10:25:09	anonymous	Stark county	Yes	Extreme Winter Storm Events (Ice or Snow Storm);Hail;Windstorm / High Wind Events;Flood;		Only a little bit worried	8	causing damage to my property;
78	8/22/23 12:50:19	8/22/23 12:53:28	anonymous	Fargo	Yes	Windstorm / High Wind Events;Extreme Heat;Flood;Extreme Winter Storm Events (Ice or Snow Storm);		Very worried	8	causing damage to where I live;impacting roads, bridges, and buildings in my community;harming people I care about;costing me money (missed work or injuries);
79	8/22/23 14:55:34	8/22/23 15:01:57	anonymous	Minot	Yes	Flood;Extreme Winter Storm Events (Ice or Snow Storm);Hazardous Material Event (Chemical Spill);Transportation Disaster (Road or Rail Crash) ;	Space Weather, Cyber attack, Active shooter	Somewhat worried	6	causing damage to where I live;impacting roads, bridges, and buildings in my community;harming people I care about;costing me money (missed work or injuries);
80	8/22/23 15:14:15	8/22/23 15:17:31	anonymous	Mandan	Yes	Flood;Extreme Winter Storm Events (Ice or Snow Storm);Tornados;Drought;		Somewhat worried	7	causing damage to where I live;impacting roads, bridges, and buildings in my community;harming people I care about;costing me money (missed work or injuries);
81	8/22/23 15:14:38	8/22/23 15:23:55	anonymous	Bismarck, ND	Yes	Extreme Winter Storm Events (Ice or Snow Storm);Hail;Transportation Disaster (Road or Rail Crash) ;		Not worried at all	1	causing damage to where I live;impacting roads, bridges, and buildings in my community;harming people I care about;costing me money (missed work or injuries);
82	8/22/23 15:22:58	8/22/23 15:26:09	anonymous	Bismarck	Yes	Flood;Hail;Windstorm / High Wind Events;Extreme Winter Storm Events (Ice or Snow Storm);		Only a little bit worried	5	causing damage to where I live;causing damage to my business;causing damage to my property;costing me money (missed work or injuries);
83	8/22/23 16:26:36	8/22/23 16:36:18	anonymous	Fargo, ND	Unsure	Extreme Winter Storm Events (Ice or Snow Storm);Windstorm / High Wind Events;Transportation Disaster (Road or Rail Crash) ;Flood;	Mental health crises leading to shootings, stabbings, other safety concerns	Somewhat worried	2	impacting roads, bridges, and buildings in my community;harming people I care about;costing me money (missed work or injuries);
84	8/22/23 17:48:09	8/22/23 17:55:14	anonymous	Bismarck	No	Extreme Heat;Extreme Winter Storm Events (Ice or Snow Storm);Windstorm / High Wind Events;Hail;	No	Only a little bit worried	6	causing damage to my property;harming people I care about;
85	8/22/23 18:18:41	8/22/23 18:22:25	anonymous	Fargo	Yes	Extreme Heat;Extreme Winter Storm Events (Ice or Snow Storm);Flood;Windstorm / High Wind Events;		Only a little bit worried	3	causing damage to where I live;impacting roads, bridges, and buildings in my community;harming people I care about;costing me money (missed work or injuries);

ID	Start time	Completion time	Email	In which community do you live?	In general, do you think disaster events or severe storms could have a major impact on your community in the future?	Please select the top 4 hazards you think are the biggest threat to your area.	Are you worried about any potential disaster events that we did not list?	How worried are you about the possibility of your community being impacted by a disaster?	On a scale of 1-10, how prepared do you feel for a disaster? (10=very, 1=not at all)	Check all that apply: "I am worried about a disaster event..."
86	8/22/23 18:59:31	8/22/23 19:03:19	anonymous	Fargo	Unsure	Dam Failure;Extreme Winter Storm Events (Ice or Snow Storm);Flood;Transportation Disaster (Road or Rail Crash) ;		Somewhat worried	4	causing damage to where I live;impacting roads, bridges, and buildings in my community;harming people I care about;costing me money (missed work or injuries);
87	8/22/23 19:15:35	8/22/23 19:26:01	anonymous	Northeast Bismarck	Yes	Drought;Extreme Winter Storm Events (Ice or Snow Storm);Flood;	Climate change	Only a little bit worried	5	impacting roads, bridges, and buildings in my community;harming people I care about;
88	8/22/23 19:49:08	8/22/23 19:53:04	anonymous	Bismarck	Yes	Extreme Winter Storm Events (Ice or Snow Storm);Flood;Hail;Tornados;	No	Only a little bit worried	6	causing damage to where I live;causing damage to my business;causing damage to my property;impacting roads, bridges, and buildings in my community;harming people I care about;costing me money (missed work or injuries);
89	8/22/23 20:37:10	8/22/23 20:47:27	anonymous	Bismarck	Yes	Extreme Winter Storm Events (Ice or Snow Storm);Tornados;Transportation Disaster (Road or Rail Crash) ;	No	Only a little bit worried	8	causing damage to my property;causing damage to where I live;impacting roads, bridges, and buildings in my community;harming people I care about;
90	8/23/23 5:24:27	8/23/23 5:28:56	anonymous	Bismarck	Yes	Flood;Dam Failure;Wildfire;Tornados;	Cyber	Somewhat worried	8	causing damage to where I live;causing damage to my business;causing damage to my property;impacting roads, bridges, and buildings in my community;harming people I care about;costing me money (missed work or injuries);
91	8/23/23 5:46:43	8/23/23 5:55:05	anonymous	Napoleon	Yes	Drought;Extreme Winter Storm Events (Ice or Snow Storm);Wildfire;Tornados;	no	Only a little bit worried	3	causing damage to my business;impacting roads, bridges, and buildings in my community;causing damage to where I live;costing me money (missed work or injuries);
92	8/23/23 6:06:40	8/23/23 6:16:20	anonymous	Minot, ND	Yes	Drought;Extreme Winter Storm Events (Ice or Snow Storm);Flood;Windstorm / High Wind Events;	No	Somewhat worried	2	harming people I care about;costing me money (missed work or injuries);impacting roads, bridges, and buildings in my community;
93	8/23/23 5:57:16	8/23/23 6:16:30	anonymous	Bismarck, ND	Yes	Drought;Flood;Hazardous Material Event (Chemical Spill);Wildfire;		Somewhat worried	8	impacting roads, bridges, and buildings in my community;harming people I care about;causing damage to where I live;
94	8/23/23 6:14:17	8/23/23 6:19:09	anonymous	Bismarck	Yes	Flood;Hail;Tornados;Blizzard;	Blizzard	Only a little bit worried	8	costing me money (missed work or injuries);impacting roads, bridges, and buildings in my community;causing damage to my property;
95	8/23/23 6:31:15	8/23/23 6:40:20	anonymous	Berthold	Yes	Extreme Winter Storm Events (Ice or Snow Storm);Tornados;Hazardous Material Event (Chemical Spill);Transportation Disaster (Road or Rail Crash) ;	Food shortages due to the combination of inflation and supply chain issues.	Somewhat worried	6	causing damage to where I live;causing damage to my property;impacting roads, bridges, and buildings in my community;harming people I care about;costing me money (missed work or injuries);
96	8/23/23 6:37:26	8/23/23 6:41:51	anonymous	bismarck	Yes	Extreme Winter Storm Events (Ice or Snow Storm);Flood;Tornados;Transportation Disaster (Road or Rail Crash) ;	active shooter/ assailant	Somewhat worried	7	causing damage to my property;impacting roads, bridges, and buildings in my community;harming people I care about;causing damage to where I live;
97	8/23/23 6:33:44	8/23/23 6:41:54	anonymous	Minot	Yes	Drought;Transportation Disaster (Road or Rail Crash) ;Extreme Winter Storm Events (Ice or Snow Storm);Windstorm / High Wind Events;		Somewhat worried	5	causing damage to where I live;causing damage to my property;harming people I care about;
98	8/23/23 6:26:08	8/23/23 6:56:21	anonymous	Valley City/Barnes County	Yes	Dam Failure;Extreme Winter Storm Events (Ice or Snow Storm);Drought;Windstorm / High Wind Events;	No	Somewhat worried	7	causing damage to my business;causing damage to my property;impacting roads, bridges, and buildings in my community;causing damage to where I live;
99	8/23/23 7:12:04	8/23/23 7:15:14	anonymous	Bismarck	Yes	Drought;Extreme Heat;Flood;Extreme Winter Storm Events (Ice or Snow Storm);	pandemic, epidemic or epizootic	Only a little bit worried	3	causing damage to where I live;causing damage to my property;impacting roads, bridges, and buildings in my community;harming people I care about;costing me money (missed work or injuries);
100	8/23/23 7:35:16	8/23/23 7:43:19	anonymous	West Fargo	Yes	Tornados;Hazardous Material Event (Chemical Spill);	Active shooter	Only a little bit worried	8	causing damage to where I live;causing damage to my property;harming people I care about;costing me money (missed work or injuries);
101	8/23/23 8:07:19	8/23/23 8:13:01	anonymous	Stark	Yes	Transportation Disaster (Road or Rail Crash) ;Hail;Extreme Winter Storm Events (Ice or Snow Storm);Hazardous Material Event (Chemical Spill);	Democrats taking over.	Only a little bit worried	7	causing damage to where I live;causing damage to my business;causing damage to my property;impacting roads, bridges, and buildings in my community;harming people I care about;costing me money (missed work or injuries);
102	8/23/23 8:34:58	8/23/23 8:39:51	anonymous	Mohall	Yes	Extreme Winter Storm Events (Ice or Snow Storm);Tornados;Flood;Drought;		Somewhat worried	8	causing damage to where I live;causing damage to my business;causing damage to my property;impacting roads, bridges, and buildings in my community;harming people I care about;costing me money (missed work or injuries);
103	8/23/23 8:37:20	8/23/23 8:44:58	anonymous	Bismarck, ND	Yes	Dam Failure;Flood;Tornados;Windstorm / High Wind Events;		Somewhat worried	5	causing damage to where I live;impacting roads, bridges, and buildings in my community;harming people I care about;costing me money (missed work or injuries);
104	8/23/23 9:02:47	8/23/23 9:10:35	anonymous	Minot	Yes	Extreme Winter Storm Events (Ice or Snow Storm);Flood;Hail;Hazardous Material Event (Chemical Spill);		Somewhat worried	5	impacting roads, bridges, and buildings in my community;harming people I care about;causing damage to where I live;causing damage to my property;
105	8/23/23 9:08:16	8/23/23 9:11:28	anonymous	Fargo	No	Extreme Winter Storm Events (Ice or Snow Storm);Flood;Hail;Transportation Disaster (Road or Rail Crash) ;	No	Not worried at all	7	causing damage to where I live;causing damage to my business;costing me money (missed work or injuries);
106	8/23/23 8:03:00	8/23/23 9:15:57	anonymous	Cleveland/Gackle	Yes	Drought;Extreme Winter Storm Events (Ice or Snow Storm);Windstorm / High Wind Events;Wildfire;	Pandemic is close on everyone's minds	Somewhat worried	6	causing damage to my property;causing damage to where I live;impacting roads, bridges, and buildings in my community;harming people I care about;costing me money (missed work or injuries);
107	8/23/23 9:27:36	8/23/23 10:11:56	anonymous	Palermo	Yes	Extreme Winter Storm Events (Ice or Snow Storm);Hazardous Material Event (Chemical Spill);Tornados;Transportation Disaster (Road or Rail Crash) ;		Very worried	8	causing damage to where I live;causing damage to my property;impacting roads, bridges, and buildings in my community;harming people I care about;
108	8/23/23 11:43:47	8/23/23 11:47:29	anonymous	Morton	Yes	Extreme Winter Storm Events (Ice or Snow Storm);Hail;Tornados;Dam Failure;		Somewhat worried	1	causing damage to where I live;impacting roads, bridges, and buildings in my community;harming people I care about;costing me money (missed work or injuries);
109	8/23/23 11:42:08	8/23/23 11:48:32	anonymous			Extreme Winter Storm Events (Ice or Snow Storm);Hazardous Material Event (Chemical Spill);Tornados;Windstorm / High Wind Events;		Somewhat worried	4	causing damage to where I live;causing damage to my property;costing me money (missed work or injuries);impacting roads, bridges, and buildings in my community;
110	8/23/23 11:57:43	8/23/23 12:06:40	anonymous	Dickinson	Yes	Extreme Winter Storm Events (Ice or Snow Storm);Hail;Hazardous Material Event (Chemical Spill);Tornados;		Only a little bit worried	5	causing damage to where I live;harming people I care about;impacting roads, bridges, and buildings in my community;
111	8/23/23 12:29:22	8/23/23 12:36:04	anonymous	Devils Lake	Yes	Transportation Disaster (Road or Rail Crash) ;Flood;Hazardous Material Event (Chemical Spill);Tornados;		Only a little bit worried	5	causing damage to where I live;causing damage to my property;impacting roads, bridges, and buildings in my community;harming people I care about;
112	8/23/23 12:35:28	8/23/23 12:39:47	anonymous	WAHPETON	Yes	Extreme Winter Storm Events (Ice or Snow Storm);Flood;Tornados;Infectious Disease;	NO	Somewhat worried	8	harming people I care about;
113	8/23/23 13:40:29	8/23/23 13:48:17	anonymous	Dickinson	Yes	Extreme Winter Storm Events (Ice or Snow Storm);Hail;Tornados;Windstorm / High Wind Events;		Very worried	7	causing damage to where I live;impacting roads, bridges, and buildings in my community;harming people I care about;costing me money (missed work or injuries);

ID	Start time	Completion time	Email	In which community do you live?	In general, do you think disaster events or severe storms could have a major impact on your community in the future?	Please select the top 4 hazards you think are the biggest threat to your area.	Are you worried about any potential disaster events that we did not list?	How worried are you about the possibility of your community being impacted by a disaster?	On a scale of 1-10, how prepared do you feel for a disaster? (10=very, 1=not at all)	Check all that apply: "I am worried about a disaster event..."
114	8/23/23 15:17:00	8/23/23 15:27:16	anonymous	Fargo	Yes	Flood;Invasive pests;Infectious Disease;	No	Not worried at all	5	causing damage to where I live;impacting roads, bridges, and buildings in my community;That others choose not to prepare for;
115	8/23/23 15:27:12	8/23/23 15:32:25	anonymous	Dickinson	No	Hail;Tornados;	No	Not worried at all	6	causing damage to where I live;harming people I care about;costing me money (missed work or injuries);
116	8/23/23 15:24:41	8/23/23 15:39:42	anonymous	Mercer	Yes	Extreme Winter Storm Events (Ice or Snow Storm);Hail;Windstorm / High Wind Events;Drought;		Somewhat worried	6	causing damage to where I live;causing damage to my property;harming people I care about;costing me money (missed work or injuries);impacting roads, bridges, and buildings in my community;
117	8/23/23 15:41:54	8/23/23 15:49:36	anonymous	Bismarck	Yes	Transportation Disaster (Road or Rail Crash) ;Extreme Winter Storm Events (Ice or Snow Storm);Flood;Windstorm / High Wind Events;		Only a little bit worried		impacting roads, bridges, and buildings in my community;
118	8/23/23 17:07:05	8/23/23 17:16:30	anonymous	Williston	Yes	Extreme Winter Storm Events (Ice or Snow Storm);Hazardous Material Event (Chemical Spill);Transportation Disaster (Road or Rail Crash) ;Windstorm / High Wind Events;	Domestic or International Terrorism	Somewhat worried	7	causing damage to where I live;causing damage to my property;impacting roads, bridges, and buildings in my community;harming people I care about;
119	8/23/23 17:12:41	8/23/23 17:20:01	anonymous	Williston	Yes	Extreme Winter Storm Events (Ice or Snow Storm);Hail;Tornados;Wildfire;	No	Only a little bit worried	10	causing damage to my property;causing damage to where I live;harming people I care about;
120	8/23/23 19:10:28	8/23/23 19:14:05	anonymous	New Rockford	Yes	Drought;Extreme Winter Storm Events (Ice or Snow Storm);Windstorm / High Wind Events;Tornados;	No	Only a little bit worried	5	causing damage to where I live;causing damage to my property;impacting roads, bridges, and buildings in my community;harming people I care about;
121	8/23/23 19:13:37	8/23/23 19:16:45	anonymous	Fargo		Flood;		Somewhat worried	7	impacting roads, bridges, and buildings in my community;
122	8/23/23 19:43:35	8/23/23 19:56:45	anonymous	Fargo ND	Yes	Drought;Extreme Winter Storm Events (Ice or Snow Storm);Flood;Windstorm / High Wind Events;		Only a little bit worried	8	causing damage to where I live;causing damage to my property;impacting roads, bridges, and buildings in my community;
123	8/24/23 5:46:04	8/24/23 5:55:29	anonymous	Grand Forks	Yes	Tornados;Flood;Extreme Winter Storm Events (Ice or Snow Storm);Infectious Disease;		Somewhat worried	5	causing damage to where I live;impacting roads, bridges, and buildings in my community;harming people I care about;costing me money (missed work or injuries);
124	8/24/23 6:30:41	8/24/23 6:41:17	anonymous	Adams County	Yes	Extreme Winter Storm Events (Ice or Snow Storm);Wildfire;Hazardous Material Event (Chemical Spill);Tornados;	no	Somewhat worried	7	impacting roads, bridges, and buildings in my community;
125	8/24/23 6:35:41	8/24/23 6:42:24	anonymous	McHenry County, North dakota	Yes	Drought;Extreme Winter Storm Events (Ice or Snow Storm);Flood;Extreme Heat;			6	causing damage to where I live;impacting roads, bridges, and buildings in my community;causing damage to my property;causing damage to my business;
126	8/24/23 8:15:01	8/24/23 8:20:25	anonymous	Bottineau	No	Drought;Hail;Extreme Winter Storm Events (Ice or Snow Storm);Windstorm / High Wind Events;	No	Not worried at all	3	causing damage to my property;causing damage to where I live;
127	8/24/23 7:39:34	8/24/23 9:13:07	anonymous	McHenry County, ND	Yes	Drought;Extreme Heat;Flood;Extreme Winter Storm Events (Ice or Snow Storm);		Only a little bit worried	8	causing damage to where I live;impacting roads, bridges, and buildings in my community;harming people I care about;Causing major effects in area agriculture.;
128	8/24/23 9:34:38	8/24/23 9:38:54	anonymous	Bismarck	Unsure	Extreme Winter Storm Events (Ice or Snow Storm);Hail;Windstorm / High Wind Events;	No	Not worried at all	6	harming people I care about;impacting roads, bridges, and buildings in my community;
129	8/24/23 12:26:16	8/24/23 12:28:47	anonymous	Griggs County	Yes	Drought;Infectious Disease;Extreme Winter Storm Events (Ice or Snow Storm);Transportation Disaster (Road or Rail Crash) ;		Only a little bit worried	2	causing damage to my property;impacting roads, bridges, and buildings in my community;costing me money (missed work or injuries);
130	8/24/23 13:06:39	8/24/23 13:11:30	anonymous	Fargo	Yes	Drought;Extreme Winter Storm Events (Ice or Snow Storm);Flood;Windstorm / High Wind Events;	No	Not worried at all	6	causing damage to my business;
131	8/24/23 13:09:56	8/24/23 13:14:29	anonymous	Fargo	Yes	Extreme Winter Storm Events (Ice or Snow Storm);Hazardous Material Event (Chemical Spill);Tornados;Transportation Disaster (Road or Rail Crash) ;	Riots	Only a little bit worried	4	causing damage to where I live;causing damage to my property;harming people I care about;impacting roads, bridges, and buildings in my community;
132	8/24/23 14:19:38	8/24/23 14:24:28	anonymous	Mountrail/Stanley	Yes	Extreme Winter Storm Events (Ice or Snow Storm);Hail;Windstorm / High Wind Events;		Somewhat worried	7	causing damage to where I live;causing damage to my property;costing me money (missed work or injuries);
133	8/24/23 14:18:24	8/24/23 14:32:11	anonymous	Minto	Yes	Drought;Extreme Winter Storm Events (Ice or Snow Storm);Flood;Transportation Disaster (Road or Rail Crash) ;	Power/cell service outage	Somewhat worried		causing damage to where I live;causing damage to my property;impacting roads, bridges, and buildings in my community;harming people I care about;
134	8/24/23 14:30:44	8/24/23 14:35:31	anonymous	Bismarck	Yes	Extreme Winter Storm Events (Ice or Snow Storm);Flood;Infectious Disease;Tornados;		Somewhat worried	6	harming people I care about;causing damage to where I live;causing damage to my business;causing damage to my property;impacting roads, bridges, and buildings in my community;costing me money (missed work or injuries);
135	8/24/23 14:36:22	8/24/23 14:47:23	anonymous			Drought;Flood;Hazardous Material Event (Chemical Spill);Infectious Disease;		Somewhat worried	3	causing damage to where I live;causing damage to my property;impacting roads, bridges, and buildings in my community;harming people I care about;costing me money (missed work or injuries);damage to critical infrastructure and supply chains;
136	8/24/23 16:19:47	8/24/23 16:27:41	anonymous	Burliegh	Unsure	Drought;Extreme Heat;Extreme Winter Storm Events (Ice or Snow Storm);Hail;	No	Only a little bit worried	7	causing damage to my property;causing damage to where I live;impacting roads, bridges, and buildings in my community;
137	8/24/23 16:37:33	8/24/23 16:39:58	anonymous	Cavalier county	No	Drought;Extreme Heat;Extreme Winter Storm Events (Ice or Snow Storm);Windstorm / High Wind Events;	No	Not worried at all	10	Not worried ;
138	8/24/23 16:40:31	8/24/23 16:46:21	anonymous	Fargo	Unsure	Drought;Too gov. Crotronl;	No	Not worried at all	1	harming people I care about;
139	8/24/23 17:20:47	8/24/23 17:26:28	anonymous	Bismarck	No	Flood;Windstorm / High Wind Events;Dam Failure;	No	Not worried at all	9	causing damage to my property;
140	8/24/23 19:55:29	8/24/23 20:02:09	anonymous	Bismarck	Yes	Extreme Winter Storm Events (Ice or Snow Storm);Hazardous Material Event (Chemical Spill);Wildfire;Tornados;	No	Somewhat worried	8	causing damage to where I live;causing damage to my property;impacting roads, bridges, and buildings in my community;harming people I care about;costing me money (missed work or injuries);

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141	8/24/23 21:02:35	8/24/23 21:05:17	anonymous	Stanley	Yes	Extreme Winter Storm Events (Ice or Snow Storm);Tornados;Transportation Disaster (Road or Rail Crash) ;Wildfire;		Somewhat worried	6	causing damage to where I live;causing damage to my business;causing damage to my property;impacting roads, bridges, and buildings in my community;harming people I care about;costing me money (missed work or injuries);
142	8/24/23 22:36:46	8/24/23 22:55:25	anonymous	Stanley ND / mountrail county	Yes	Extreme Winter Storm Events (Ice or Snow Storm);Extreme Heat;Hazardous Material Event (Chemical Spill);Windstorm / High Wind Events;		Somewhat worried	4	causing damage to where I live;impacting roads, bridges, and buildings in my community;
143	8/25/23 6:22:00	8/25/23 6:24:19	anonymous	Minot	Yes	Extreme Winter Storm Events (Ice or Snow Storm);Hail;Transportation Disaster (Road or Rail Crash) ;Infectious Disease;	No	Somewhat worried	4	causing damage to where I live;causing damage to my property;impacting roads, bridges, and buildings in my community;harming people I care about;costing me money (missed work or injuries);
144	8/25/23 6:44:57	8/25/23 6:50:04	anonymous	West Fargo	Yes	Extreme Winter Storm Events (Ice or Snow Storm);Tornados;Windstorm / High Wind Events;Infectious Disease;		Only a little bit worried	8	causing damage to where I live;causing damage to my property;impacting roads, bridges, and buildings in my community;harming people I care about;
145	8/25/23 8:42:25	8/25/23 8:47:14	anonymous	Bismarck	Yes	Extreme Heat;Extreme Winter Storm Events (Ice or Snow Storm);Windstorm / High Wind Events;		Only a little bit worried	2	causing damage to where I live;harming people I care about;impacting roads, bridges, and buildings in my community;
146	8/25/23 11:46:59	8/25/23 11:54:50	anonymous	NE North Dakota	Yes	Extreme Winter Storm Events (Ice or Snow Storm);Tornados;Drought;Wildfire;	power outage due to weather	Somewhat worried	5	causing damage to where I live;causing damage to my property;harming people I care about;costing me money (missed work or injuries);impacting roads, bridges, and buildings in my community;
147	8/25/23 21:25:34	8/25/23 21:30:25	anonymous	Upham	Yes	Extreme Winter Storm Events (Ice or Snow Storm);Windstorm / High Wind Events;Drought;Hail;		Somewhat worried	4	causing damage to where I live;causing damage to my property;impacting roads, bridges, and buildings in my community;
148	8/26/23 5:09:39	8/26/23 5:12:27	anonymous	New Town	Yes	Extreme Winter Storm Events (Ice or Snow Storm);Flood;Tornados;Hail;	No	Somewhat worried	8	causing damage to where I live;causing damage to my property;impacting roads, bridges, and buildings in my community;harming people I care about;costing me money (missed work or injuries);
149	8/26/23 15:44:13	8/26/23 15:53:53	anonymous	Ward County	Yes	Extreme Winter Storm Events (Ice or Snow Storm);Flood;Hazardous Material Event (Chemical Spill);Infectious Disease;	Incompetent city commissioners and county commissioners can cause any issue to implode!	Somewhat worried	7	causing damage to where I live;causing damage to my business;causing damage to my property;impacting roads, bridges, and buildings in my community;harming people I care about;costing me money (missed work or injuries);No accountability for negligence of landlords ;
150	8/27/23 7:38:51	8/27/23 7:41:30	anonymous	Kindred	Yes	Extreme Winter Storm Events (Ice or Snow Storm);Flood;Hail;Windstorm / High Wind Events;		Only a little bit worried	7	causing damage to where I live;causing damage to my property;costing me money (missed work or injuries);harming people I care about;
151	8/27/23 9:26:16	8/27/23 9:31:07	anonymous	Ashley	Yes	Extreme Winter Storm Events (Ice or Snow Storm);Tornados;Windstorm / High Wind Events;Infectious Disease;	N/a	Only a little bit worried	7	costing me money (missed work or injuries);harming people I care about;impacting roads, bridges, and buildings in my community;causing damage to my property;causing damage to where I live;
152	8/28/23 7:47:42	8/28/23 7:52:53	anonymous	Bismarck/Mandan	Yes	Extreme Winter Storm Events (Ice or Snow Storm);Flood;	No	Only a little bit worried	8	causing damage to my property;impacting roads, bridges, and buildings in my community;
153	8/28/23 7:47:05	8/28/23 7:57:58	anonymous	Dickinson	Yes	Drought;Extreme Heat;Extreme Winter Storm Events (Ice or Snow Storm);Windstorm / High Wind Events;	No	Not worried at all	7	impacting roads, bridges, and buildings in my community;
154	8/28/23 7:54:13	8/28/23 8:06:46	anonymous	Lincoln	Yes	Transportation Disaster (Road or Rail Crash) ;Extreme Winter Storm Events (Ice or Snow Storm);Extreme Heat;Windstorm / High Wind Events;	cyberattack on infrastructure	Only a little bit worried	6	impacting roads, bridges, and buildings in my community;causing damage to where I live;causing damage to my property;
155	8/28/23 8:24:08	8/28/23 8:30:07	anonymous	Fargo nd	Yes	Extreme Winter Storm Events (Ice or Snow Storm);Transportation Disaster (Road or Rail Crash) ;Tornados;Infectious Disease;		Somewhat worried	5	causing damage to where I live;causing damage to my business;causing damage to my property;impacting roads, bridges, and buildings in my community;harming people I care about;costing me money (missed work or injuries);
156	8/28/23 8:44:01	8/28/23 8:46:57	anonymous	Bismarck	Yes	Extreme Winter Storm Events (Ice or Snow Storm);Extreme Heat;Wildfire;Flood;	No	Somewhat worried	4	causing damage to where I live;harming people I care about;causing damage to my property;
157	8/28/23 8:48:48	8/28/23 8:58:51	anonymous	Bismarck	Yes	Extreme Winter Storm Events (Ice or Snow Storm);Infectious Disease;Drought;		Somewhat worried	6	impacting roads, bridges, and buildings in my community;Our roads need to be cleared faster in the winter. If someone in the neighborhood has an emergency- it will be hard to get help for them or get them out. One week is too long to wait to get out!;
158	8/29/23 5:10:11	8/29/23 5:13:58	anonymous	Hettinger County	Yes	Extreme Winter Storm Events (Ice or Snow Storm);Windstorm / High Wind Events;Wildfire;Tornados;	No	Only a little bit worried	8	causing damage to where I live;
159	8/29/23 10:01:42	8/29/23 10:07:22	anonymous	New Rockford	Yes	Extreme Winter Storm Events (Ice or Snow Storm);Flood;Wildfire;Windstorm / High Wind Events;		Somewhat worried	7	causing damage to where I live;harming people I care about;costing me money (missed work or injuries);impacting roads, bridges, and buildings in my community;causing damage to my property;
160	8/29/23 14:38:57	8/29/23 14:42:49	anonymous	New Rockford	Yes	Extreme Winter Storm Events (Ice or Snow Storm);Tornados;Windstorm / High Wind Events;Hail;		Only a little bit worried	9	causing damage to where I live;impacting roads, bridges, and buildings in my community;harming people I care about;
161	8/29/23 17:42:00	8/29/23 17:45:01	anonymous	Carrington	Yes	Extreme Winter Storm Events (Ice or Snow Storm);Drought;Windstorm / High Wind Events;Tornados;		Somewhat worried	1	causing damage to my property;causing damage to where I live;harming people I care about;costing me money (missed work or injuries);
162	8/30/23 6:25:44	8/30/23 6:31:18	anonymous	Carrington, ND	Unsure	Drought;Extreme Winter Storm Events (Ice or Snow Storm);Windstorm / High Wind Events;Transportation Disaster (Road or Rail Crash) ;	No	Not worried at all	8	harming people I care about;impacting roads, bridges, and buildings in my community;costing me money (missed work or injuries);
163	8/30/23 7:19:06	8/30/23 7:22:14	anonymous	Bismarck	Yes	Drought;Extreme Winter Storm Events (Ice or Snow Storm);Hail;Transportation Disaster (Road or Rail Crash) ;		Somewhat worried	1	causing damage to where I live;impacting roads, bridges, and buildings in my community;harming people I care about;costing me money (missed work or injuries);
164	8/30/23 18:07:16	8/30/23 18:19:16	anonymous	Garrison	Yes	Hail;Hazardous Material Event (Chemical Spill);Tornados;Transportation Disaster (Road or Rail Crash) ;		Only a little bit worried	8	causing damage to where I live;
165	8/31/23 6:19:11	8/31/23 6:24:55	anonymous	Bismarck	Yes	Extreme Winter Storm Events (Ice or Snow Storm);Flood;Hail;Windstorm / High Wind Events;	No	Only a little bit worried	10	causing damage to where I live;causing damage to my business;causing damage to my property;impacting roads, bridges, and buildings in my community;harming people I care about;costing me money (missed work or injuries);

ID	Start time	Completion time	Email	In which community do you live?	In general, do you think disaster events or severe storms could have a major impact on your community in the future?	Please select the top 4 hazards you think are the biggest threat to your area.	Are you worried about any potential disaster events that we did not list?	How worried are you about the possibility of your community being impacted by a disaster?	On a scale of 1-10, how prepared do you feel for a disaster? (10=very, 1=not at all)	Check all that apply: "I am worried about a disaster event..."
166	9/1/23 6:13:22	9/1/23 6:28:08	anonymous	Carrington	Yes	Drought;Extreme Winter Storm Events (Ice or Snow Storm);Infectious Disease;Hazardous Material Event (Chemical Spill);		Somewhat worried	4	causing damage to where I live;causing damage to my property;impacting roads, bridges, and buildings in my community;harming people I care about;
167	9/5/23 13:42:33	9/5/23 14:02:28	anonymous	Bismarck	Yes	Extreme Heat;Extreme Winter Storm Events (Ice or Snow Storm);Flood;Hail;		Somewhat worried	6	causing damage to where I live;impacting roads, bridges, and buildings in my community;
168	9/5/23 16:00:33	9/5/23 16:11:23	anonymous	Bismarck	Yes	Hail;Windstorm / High Wind Events;Extreme Winter Storm Events (Ice or Snow Storm);Transportation Disaster (Road or Rail Crash) ;	No	Somewhat worried	7	causing damage to where I live;causing damage to my property;impacting roads, bridges, and buildings in my community;harming people I care about;costing me money (missed work or injuries);
169	9/5/23 16:23:11	9/5/23 16:49:52	anonymous	Bismarck	Yes	Extreme Winter Storm Events (Ice or Snow Storm);Hail;Flood;Drought;		Only a little bit worried	5	causing damage to where I live;harming people I care about;costing me money (missed work or injuries);
170	9/6/23 7:13:00	9/6/23 7:16:57	anonymous	Burleigh County	Yes	Extreme Winter Storm Events (Ice or Snow Storm);Flood;Hail;Transportation Disaster (Road or Rail Crash) ;	No	Only a little bit worried	7	causing damage to my property;impacting roads, bridges, and buildings in my community;harming people I care about;
171	9/6/23 7:23:35	9/6/23 7:29:01	anonymous	Wyndmere	Yes	Extreme Winter Storm Events (Ice or Snow Storm);Tornados;Transportation Disaster (Road or Rail Crash) ;Hazardous Material Event (Chemical Spill);		Only a little bit worried	8	causing damage to where I live;causing damage to my property;harming people I care about;
172	9/6/23 7:26:34	9/6/23 7:30:15	anonymous	Fargo	Yes	Flood;Tornados;Extreme Winter Storm Events (Ice or Snow Storm);	No	Not worried at all	8	causing damage to where I live;causing damage to my property;impacting roads, bridges, and buildings in my community;costing me money (missed work or injuries);
173	9/6/23 7:23:48	9/6/23 7:41:08	anonymous		Yes	Extreme Winter Storm Events (Ice or Snow Storm);Windstorm / High Wind Events;Drought;Hazardous Material Event (Chemical Spill);		Somewhat worried	8	causing damage to where I live;causing damage to my business;harming people I care about;costing me money (missed work or injuries);
174	9/6/23 7:53:21	9/6/23 7:56:26	anonymous	stutsman county	Yes	Tornados;Extreme Winter Storm Events (Ice or Snow Storm);Hazardous Material Event (Chemical Spill);Drought;		Somewhat worried	10	causing damage to where I live;causing damage to my business;causing damage to my property;impacting roads, bridges, and buildings in my community;harming people I care about;
175	9/6/23 7:55:20	9/6/23 8:03:42	anonymous	Minot	Yes	Extreme Winter Storm Events (Ice or Snow Storm);Flood;Windstorm / High Wind Events;Hazardous Material Event (Chemical Spill);	NA	Somewhat worried	5	causing damage to where I live;causing damage to my business;causing damage to my property;impacting roads, bridges, and buildings in my community;harming people I care about;costing me money (missed work or injuries);
176	9/6/23 8:14:05	9/6/23 8:21:28	anonymous	Harvey, ND	Yes	Extreme Winter Storm Events (Ice or Snow Storm);Transportation Disaster (Road or Rail Crash) ;Drought;Windstorm / High Wind Events;	No	Only a little bit worried	7	causing damage to where I live;causing damage to my business;causing damage to my property;impacting roads, bridges, and buildings in my community;harming people I care about;costing me money (missed work or injuries);
177	9/6/23 8:33:27	9/6/23 8:36:46	anonymous	Wells County	Yes	Extreme Winter Storm Events (Ice or Snow Storm);Flood;Hail;Windstorm / High Wind Events;	No	Somewhat worried	10	causing damage to where I live;causing damage to my property;
178	9/6/23 8:40:17	9/6/23 8:47:02	anonymous	Wells County	Yes	Dam Failure;Drought;Extreme Winter Storm Events (Ice or Snow Storm);Windstorm / High Wind Events;	No	Somewhat worried	8	causing damage to my property;impacting roads, bridges, and buildings in my community;
179	9/6/23 8:51:07	9/6/23 8:54:09	anonymous	Bismarck	Yes	Drought;Extreme Winter Storm Events (Ice or Snow Storm);Flood;Hazardous Material Event (Chemical Spill);	No	Somewhat worried	9	causing damage to where I live;causing damage to my property;impacting roads, bridges, and buildings in my community;harming people I care about;costing me money (missed work or injuries);
180	9/6/23 9:39:16	9/6/23 9:45:35	anonymous	Bismarck	Yes	Hazardous Material Event (Chemical Spill);Transportation Disaster (Road or Rail Crash) ;Infectious Disease;Tornados;		Very worried	9	causing damage to where I live;causing damage to my business;causing damage to my property;impacting roads, bridges, and buildings in my community;harming people I care about;costing me money (missed work or injuries);
181	9/6/23 10:54:47	9/6/23 10:58:22	anonymous	Bismarck	Yes	Flood;Extreme Winter Storm Events (Ice or Snow Storm);Tornados;Windstorm / High Wind Events;	no	Somewhat worried	8	causing damage to where I live;causing damage to my business;causing damage to my property;harming people I care about;costing me money (missed work or injuries);impacting roads, bridges, and buildings in my community;
182	9/6/23 10:47:29	9/6/23 11:06:39	anonymous	Mandan	Yes	Drought;Extreme Heat;Extreme Winter Storm Events (Ice or Snow Storm);Tornados;	no	Only a little bit worried	3	causing damage to my property;
183	9/6/23 11:46:22	9/6/23 11:51:12	anonymous	Mandan	Yes	Hail;Transportation Disaster (Road or Rail Crash) ;Extreme Winter Storm Events (Ice or Snow Storm);Infectious Disease;	no	Only a little bit worried	7	impacting roads, bridges, and buildings in my community;harming people I care about;costing me money (missed work or injuries);
184	9/6/23 12:49:13	9/6/23 13:03:07	anonymous	Beulah North Dakota	Yes	Drought;Extreme Winter Storm Events (Ice or Snow Storm);Tornados;Hazardous Material Event (Chemical Spill);	Hail,	Somewhat worried	8	harming people I care about;Residents where I work;
185	9/6/23 13:00:34	9/6/23 13:16:50	anonymous	Langdon	Yes	Extreme Winter Storm Events (Ice or Snow Storm);Hazardous Material Event (Chemical Spill);Infectious Disease;Transportation Disaster (Road or Rail Crash) ;	Infrastructure failure-power grid, internet, banking system	Somewhat worried	7	causing damage to my property;impacting roads, bridges, and buildings in my community;harming people I care about;costing me money (missed work or injuries);causing damage to where I live;causing damage to my business;
186	9/7/23 7:09:18	9/7/23 7:14:33	anonymous	Wells County	Yes	Drought;Extreme Winter Storm Events (Ice or Snow Storm);Flood;Windstorm / High Wind Events;	No	Only a little bit worried	8	causing damage to where I live;causing damage to my property;impacting roads, bridges, and buildings in my community;costing me money (missed work or injuries);
187	9/7/23 7:07:28	9/7/23 7:16:56	anonymous	Rugby	Yes	Drought;Extreme Winter Storm Events (Ice or Snow Storm);Tornados;Windstorm / High Wind Events;	No	Only a little bit worried	5	causing damage to my property;impacting roads, bridges, and buildings in my community;
188	9/7/23 7:04:57	9/7/23 7:20:01	anonymous	Rugby	Yes	Drought;Extreme Winter Storm Events (Ice or Snow Storm);Hazardous Material Event (Chemical Spill);Transportation Disaster (Road or Rail Crash) ;	No	Only a little bit worried	6	impacting roads, bridges, and buildings in my community;harming people I care about;
189	9/7/23 7:46:19	9/7/23 7:50:50	anonymous	Bismarck, ND	Yes	Extreme Winter Storm Events (Ice or Snow Storm);Hail;Tornados;Windstorm / High Wind Events;		Somewhat worried	8	causing damage to where I live;causing damage to my business;causing damage to my property;harming people I care about;
190	9/14/23 12:16:59	9/14/23 12:20:32	anonymous	Dickinson	Yes	Extreme Winter Storm Events (Ice or Snow Storm);Drought;Infectious Disease;Hail;	NA	Somewhat worried	8	causing damage to where I live;causing damage to my property;impacting roads, bridges, and buildings in my community;harming people I care about;costing me money (missed work or injuries);

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191	9/14/23 12:09:27	9/14/23 12:22:24	anonymous	Mercer County	Yes	Extreme Winter Storm Events (Ice or Snow Storm);Flood;Hazardous Material Event (Chemical Spill);Windstorm / High Wind Events;	Mass Casuality	Only a little bit worried	5	causing damage to where I live;impacting roads, bridges, and buildings in my community;harming people I care about;
192	9/20/23 12:26:09	9/20/23 12:29:39	anonymous	Burleigh County	Yes	Flood;Extreme Winter Storm Events (Ice or Snow Storm);Tornados;Windstorm / High Wind Events;	None	Very worried	8	causing damage to where I live;causing damage to my property;harming people I care about;costing me money (missed work or injuries);
193	9/20/23 12:24:33	9/20/23 12:35:18	anonymous	Bis/Mandan	Yes	Tornados;Drought;Extreme Winter Storm Events (Ice or Snow Storm);Hail;	No	Not worried at all	9	causing damage to where I live;causing damage to my property;harming people I care about;
194	9/23/23 8:04:39	9/23/23 8:12:28	anonymous	Bismarck	Yes	Drought;Flood;Extreme Winter Storm Events (Ice or Snow Storm);Hazardous Material Event (Chemical Spill);		Only a little bit worried	1	impacting roads, bridges, and buildings in my community;causing damage to where I live;harming people I care about;
195	9/23/23 8:01:07	9/23/23 10:53:54	anonymous	Mandan	Yes	Dam Failure;Drought;Extreme Heat;Extreme Winter Storm Events (Ice or Snow Storm);		Only a little bit worried	6	causing damage to my property;causing damage to where I live;
196	9/26/23 13:34:25	9/26/23 13:42:39	anonymous	Bismarck	Unsure	Extreme Winter Storm Events (Ice or Snow Storm);Hail;Infectious Disease;	Planned release of biological warfare	Somewhat worried	6	harming people I care about;impacting roads, bridges, and buildings in my community;causing damage to where I live;
197	9/26/23 15:38:22	9/26/23 15:42:47	anonymous	Bismarck	Yes	Dam Failure;Extreme Winter Storm Events (Ice or Snow Storm);Flood;Infectious Disease;		Somewhat worried	8	harming people I care about;
198	9/26/23 15:58:12	9/26/23 16:00:17	anonymous	Bismarck	Yes	Dam Failure;Extreme Heat;Extreme Winter Storm Events (Ice or Snow Storm);Hail;	nope	Somewhat worried	6	causing damage to where I live;
199	9/26/23 15:57:22	9/26/23 16:01:58	anonymous	Bismarck	Yes	Flood;Hail;Tornados;Windstorm / High Wind Events;	No	Only a little bit worried	7	causing damage to where I live;causing damage to my business;causing damage to my property;impacting roads, bridges, and buildings in my community;harming people I care about;costing me money (missed work or injuries);
200	9/26/23 15:56:26	9/26/23 16:02:37	anonymous	Bismarck	Yes	Tornados;Windstorm / High Wind Events;Extreme Winter Storm Events (Ice or Snow Storm);Transportation Disaster (Road or Rail Crash) ;		Somewhat worried	4	causing damage to where I live;causing damage to my property;
201	9/26/23 15:57:47	9/26/23 16:04:08	anonymous	Mandan, ND	Yes	Extreme Winter Storm Events (Ice or Snow Storm);Windstorm / High Wind Events;Drought;Dam Failure;		Only a little bit worried	7	causing damage to where I live;harming people I care about;
202	9/26/23 16:02:38	9/26/23 16:11:44	anonymous	Bismarck	No	Extreme Winter Storm Events (Ice or Snow Storm);Hail;Flood;Windstorm / High Wind Events;	No	Not worried at all	6	causing damage to where I live;impacting roads, bridges, and buildings in my community;harming people I care about;
203	9/27/23 15:17:07	9/27/23 15:20:08	anonymous	Bismarck		Extreme Winter Storm Events (Ice or Snow Storm);Flood;Hail;Transportation Disaster (Road or Rail Crash) ;	No	Somewhat worried	1	costing me money (missed work or injuries);impacting roads, bridges, and buildings in my community;causing damage to my property;
204	9/27/23 20:49:56	9/27/23 21:37:31	anonymous	Flasher	Yes	Extreme Winter Storm Events (Ice or Snow Storm);Windstorm / High Wind Events;Hail;Tornados;		Somewhat worried	1	causing damage to where I live;causing damage to my property;impacting roads, bridges, and buildings in my community;harming people I care about;
205	9/28/23 6:33:43	9/28/23 6:41:15	anonymous	Flasher	Yes	Extreme Winter Storm Events (Ice or Snow Storm);Tornados;Windstorm / High Wind Events;Drought;		Very worried	4	causing damage to where I live;causing damage to my property;impacting roads, bridges, and buildings in my community;harming people I care about;costing me money (missed work or injuries);
206	9/28/23 12:34:29	9/28/23 12:44:41	anonymous	Flasher	Yes	Extreme Winter Storm Events (Ice or Snow Storm);Tornados;Wildfire;Windstorm / High Wind Events;		Somewhat worried	3	harming people I care about;causing damage to where I live;causing damage to my property;impacting roads, bridges, and buildings in my community;
207	10/3/23 11:38:17	10/3/23 11:41:58	anonymous	Bismarck	Yes	Dam Failure;Extreme Heat;Extreme Winter Storm Events (Ice or Snow Storm);Tornados;	Active shooter	Somewhat worried	8	harming people I care about;costing me money (missed work or injuries);causing damage to where I live;
208	10/3/23 11:39:20	10/3/23 11:42:01	anonymous	Bismarck	No	Extreme Winter Storm Events (Ice or Snow Storm);Flood;Tornados;Windstorm / High Wind Events;	No	Not worried at all	8	causing damage to my property;harming people I care about;costing me money (missed work or injuries);
209	10/3/23 11:39:19	10/3/23 11:42:09	anonymous	Bismarck	No	Hail;Drought;Tornados;Extreme Winter Storm Events (Ice or Snow Storm);	None	Not worried at all	7	causing damage to my property;impacting roads, bridges, and buildings in my community;
210	10/3/23 11:37:54	10/3/23 11:42:50	anonymous	Bismarck, North Dakota	Yes	Extreme Heat;Extreme Winter Storm Events (Ice or Snow Storm);Flood;Hail;		Somewhat worried	7	harming people I care about;causing damage to where I live;costing me money (missed work or injuries);
211	10/3/23 11:39:13	10/3/23 11:43:25	anonymous	Bismarck	Yes	Extreme Winter Storm Events (Ice or Snow Storm);Drought;Hail;Transportation Disaster (Road or Rail Crash) ;		Only a little bit worried	7	harming people I care about;impacting roads, bridges, and buildings in my community;
212	10/3/23 11:38:42	10/3/23 11:43:44	anonymous	Bismarck	Yes	Drought;Dam Failure;Wildfire;Mental illness breakout;	Yeah, human caused disasters	Not worried at all	4	harming people I care about;
213	10/3/23 11:38:13	10/3/23 11:43:59	anonymous	Bismarck	Yes	Flood;Tornados;Extreme Winter Storm Events (Ice or Snow Storm);Dam Failure;		Only a little bit worried	8	causing damage to where I live;impacting roads, bridges, and buildings in my community;
214	10/3/23 11:41:22	10/3/23 11:44:16	anonymous	Grand Forks	Yes	Drought;Extreme Heat;Flood;Tornados;		Somewhat worried	9	causing damage to my business;causing damage to my property;harming people I care about;
215	10/3/23 11:39:42	10/3/23 11:44:25	anonymous	Standing rock	Yes	Drought;Extreme Winter Storm Events (Ice or Snow Storm);Wildfire;Windstorm / High Wind Events;		Very worried	3	causing damage to where I live;impacting roads, bridges, and buildings in my community;harming people I care about;costing me money (missed work or injuries);

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216	10/3/23 11:39:50	10/3/23 11:45:00	anonymous	Bismarck	Yes	Dam Failure;Hail;Extreme Winter Storm Events (Ice or Snow Storm);Flood;	No	Somewhat worried	5	causing damage to where I live;causing damage to my property;harming people I care about;impacting roads, bridges, and buildings in my community;costing me money (missed work or injuries);
217	10/3/23 11:38:33	10/3/23 11:45:00	anonymous	Valley city	No	Dam Failure;Drought;Flood;Extreme Winter Storm Events (Ice or Snow Storm);	No	Only a little bit worried	4	causing damage to my property;impacting roads, bridges, and buildings in my community;harming people I care about;costing me money (missed work or injuries);
218	10/3/23 11:41:02	10/3/23 12:34:24	anonymous		Unsure	Extreme Winter Storm Events (Ice or Snow Storm);Tornados;Wildfire;Windstorm / High Wind Events;		Not worried at all	6	impacting roads, bridges, and buildings in my community;harming people I care about;
219	10/3/23 11:41:15	10/3/23 12:34:45	anonymous	Bismarck	Yes	Hail;Tornados;Windstorm / High Wind Events;Extreme Winter Storm Events (Ice or Snow Storm);		Not worried at all	6	causing damage to where I live;causing damage to my property;
220	10/11/23 16:56:55	10/11/23 17:05:52	anonymous	Ward County	Yes	Flood;Hazardous Material Event (Chemical Spill);Transportation Disaster (Road or Rail Crash) ;Landslide ;	Volcano	Somewhat worried	8	impacting roads, bridges, and buildings in my community;costing me money (missed work or injuries);Food shortage ;
221	10/11/23 17:40:38	10/11/23 17:46:45	anonymous	Mandan		Extreme Winter Storm Events (Ice or Snow Storm);Hail;Tornados;Windstorm / High Wind Events;	No	Only a little bit worried	8	
222	10/11/23 17:34:52	10/11/23 17:55:23	anonymous	Mandan	Unsure	Tornados;Extreme Heat;Drought;Flood;	Deep snow	Only a little bit worried	9	causing damage to where I live;causing damage to my property;harming people I care about;costing me money (missed work or injuries);
223	10/12/23 5:39:32	10/12/23 5:44:43	anonymous	Mandan	Yes	Extreme Winter Storm Events (Ice or Snow Storm);Tornados;Flood;Hazardous Material Event (Chemical Spill);	Cyber attack	Only a little bit worried	6	causing damage to where I live;causing damage to my property;impacting roads, bridges, and buildings in my community;harming people I care about;costing me money (missed work or injuries);
224	10/12/23 16:04:20	10/12/23 16:16:15	anonymous	Bismarck	Yes	Dam Failure;Flood;Infectious Disease;Extreme Winter Storm Events (Ice or Snow Storm);		Somewhat worried	7	causing damage to where I live;causing damage to my property;impacting roads, bridges, and buildings in my community;harming people I care about;costing me money (missed work or injuries);
225	10/12/23 19:08:45	10/12/23 19:18:11	anonymous	Minot	Yes	Flood;Extreme Winter Storm Events (Ice or Snow Storm);Transportation Disaster (Road or Rail Crash) ;Hazardous Material Event (Chemical Spill);		Somewhat worried	5	causing damage to where I live;impacting roads, bridges, and buildings in my community;harming people I care about;costing me money (missed work or injuries);
226	10/12/23 19:27:45	10/12/23 19:33:23	anonymous	Lincoln	Yes	Hail;Tornados;Windstorm / High Wind Events;Drought;		Only a little bit worried	7	causing damage to where I live;causing damage to my property;impacting roads, bridges, and buildings in my community;costing me money (missed work or injuries);
227	10/12/23 19:51:11	10/12/23 19:56:56	anonymous	Washburn	Yes	Extreme Winter Storm Events (Ice or Snow Storm);Hail;Hazardous Material Event (Chemical Spill);Windstorm / High Wind Events;		Only a little bit worried	9	causing damage to my property;causing damage to my business;impacting roads, bridges, and buildings in my community;harming people I care about;costing me money (missed work or injuries);causing damage to where I live;
228	10/13/23 4:21:57	10/13/23 4:27:32	anonymous	Beulah	No	Flood;Tornados;Drought;Infectious Disease;		Somewhat worried	8	causing damage to where I live;causing damage to my property;harming people I care about;costing me money (missed work or injuries);impacting roads, bridges, and buildings in my community;
229	10/13/23 6:11:42	10/13/23 6:14:54	anonymous	Bismarck	Yes	Extreme Winter Storm Events (Ice or Snow Storm);Hail;Flood;	No	Not worried at all	8	costing me money (missed work or injuries);
230	10/13/23 9:05:17	10/13/23 9:27:43	anonymous	Dickinson	Yes	Extreme Winter Storm Events (Ice or Snow Storm);Hail;Tornados;Hazardous Material Event (Chemical Spill);	Trump becoming president again, but I don't think that's what you're asking about.	Only a little bit worried	3	causing damage to where I live;impacting roads, bridges, and buildings in my community;harming people I care about;
231	10/13/23 20:13:28	10/13/23 20:21:00	anonymous	Zeeland	Yes	Drought;Extreme Winter Storm Events (Ice or Snow Storm);Hazardous Material Event (Chemical Spill);Wildfire;	No	Somewhat worried	7	costing me money (missed work or injuries);harming people I care about;impacting roads, bridges, and buildings in my community;causing damage to my property;
232	10/13/23 21:39:21	10/13/23 21:46:18	anonymous	Griggs	Yes	Extreme Winter Storm Events (Ice or Snow Storm);Hazardous Material Event (Chemical Spill);Flood;Windstorm / High Wind Events;	No	Only a little bit worried	6	impacting roads, bridges, and buildings in my community;causing damage to my property;causing damage to where I live;
233	10/14/23 4:23:32	10/14/23 4:33:04	anonymous	Bismarck	Yes	Extreme Winter Storm Events (Ice or Snow Storm);Hail;Hazardous Material Event (Chemical Spill);Transportation Disaster (Road or Rail Crash) ;	Not worried just thinking of the ones possible	Not worried at all	5	causing damage to where I live;causing damage to my property;impacting roads, bridges, and buildings in my community;harming people I care about;costing me money (missed work or injuries);
234	10/14/23 6:01:30	10/14/23 6:15:23	anonymous	Hettinger	Yes	Drought;Extreme Winter Storm Events (Ice or Snow Storm);Hail;Windstorm / High Wind Events;	Frequently both railroad crossing here are blocked for extended periods of time. Yesterday was almost an hour. Threat to ambulance and fire department needs being met. One of the crossings is on Highway 8.	Somewhat worried		impacting roads, bridges, and buildings in my community;harming people I care about;costing me money (missed work or injuries);causing damage to where I live;
235	10/14/23 6:13:19	10/14/23 6:15:54	anonymous	Mandan	Yes	Extreme Winter Storm Events (Ice or Snow Storm);Flood;Windstorm / High Wind Events;Dam Failure;	No	Somewhat worried	8	causing damage to where I live;causing damage to my business;causing damage to my property;impacting roads, bridges, and buildings in my community;harming people I care about;costing me money (missed work or injuries);
236	10/14/23 6:12:09	10/14/23 6:26:18	anonymous	Dickinson	Yes	Hail;Extreme Winter Storm Events (Ice or Snow Storm);Drought;Tornados;	No	Somewhat worried	7	causing damage to where I live;causing damage to my property;impacting roads, bridges, and buildings in my community;harming people I care about;
237	10/14/23 6:31:43	10/14/23 6:38:28	anonymous	Bottineau	Yes	Extreme Winter Storm Events (Ice or Snow Storm);Hazardous Material Event (Chemical Spill);Transportation Disaster (Road or Rail Crash) ;		Somewhat worried	5	impacting roads, bridges, and buildings in my community;harming people I care about;causing damage to where I live;
238	10/14/23 21:52:05	10/14/23 22:01:28	anonymous	Bismarck	Yes	Drought;Extreme Heat;Hail;Infectious Disease;	No	Only a little bit worried	8	causing damage to where I live;harming people I care about;costing me money (missed work or injuries);
239	10/14/23 21:55:43	10/14/23 22:07:51	anonymous	Taylor	Yes	Extreme Winter Storm Events (Ice or Snow Storm);Drought;Flood;Extreme Heat;	Government shutdown before a war	Only a little bit worried	10	harming people I care about;impacting roads, bridges, and buildings in my community;
240	10/15/23 4:14:13	10/15/23 4:19:11	anonymous	Napoleon, ND	Yes	Flood;Tornados;Hail;Hazardous Material Event (Chemical Spill);	No	Only a little bit worried	2	causing damage to my property;harming people I care about;
241	10/15/23 12:01:21	10/15/23 12:05:29	anonymous	Valley City	Yes	Dam Failure;Extreme Winter Storm Events (Ice or Snow Storm);Hazardous Material Event (Chemical Spill);Transportation Disaster (Road or Rail Crash) ;	No	Somewhat worried	5	causing damage to where I live;impacting roads, bridges, and buildings in my community;harming people I care about;causing damage to my property;
242	10/15/23 19:02:17	10/15/23 19:13:43	anonymous	Bottineau	Yes	Tornados;Infectious Disease;Hazardous Material Event (Chemical Spill);Extreme Winter Storm Events (Ice or Snow Storm);		Only a little bit worried	8	causing damage to where I live;causing damage to my property;costing me money (missed work or injuries);

ID	Start time	Completion time	Email	In which community do you live?	In general, do you think disaster events or severe storms could have a major impact on your community in the future?	Please select the top 4 hazards you think are the biggest threat to your area.	Are you worried about any potential disaster events that we did not list?	How worried are you about the possibility of your community being impacted by a disaster?	On a scale of 1-10, how prepared do you feel for a disaster? (10=very, 1=not at all)	Check all that apply: "I am worried about a disaster event..."
243	10/17/23 8:32:52	10/17/23 9:25:39	anonymous	Bismarck	Yes	Extreme Winter Storm Events (Ice or Snow Storm);Infectious Disease;Electric power grid and communications going down, ... being hacked;	power grid going down affecting heat, commerce and communications.	Somewhat worried	6	affecting commerce: banking, food, water, gasoline, other consumables; being isolated from knowing what is going on;
244	10/18/23 15:37:29	10/18/23 15:51:23	anonymous	Williams county	Yes	Hazardous Material Event (Chemical Spill);Wildfire;Drought;An attack on the oil tank farms in our area;	Yes	Somewhat worried	6	causing damage to where I live;harming people I care about;
245	10/19/23 20:40:43	10/19/23 21:35:28	anonymous	Pembina County	Yes	Dam Failure;Drought;Extreme Heat;Flood;	carbon emissions storage pipelines	Very worried	5	costing me money (missed work or injuries);harming people I care about;impacting roads, bridges, and buildings in my community;causing damage to where I live;Causing strain on Agriculture businesses in my community (farms provide the majority of local employment here);
246	10/20/23 8:43:44	10/20/23 8:49:16	anonymous	Stanley	Yes	Transportation Disaster (Road or Rail Crash) ;Tornados;Hazardous Material Event (Chemical Spill);Extreme Winter Storm Events (Ice or Snow Storm);	No	Only a little bit worried	5	causing damage to where I live;harming people I care about;impacting roads, bridges, and buildings in my community;causing damage to my property;
247	10/20/23 21:13:28	10/20/23 21:33:07	anonymous	Belfield fryburg	Yes	Transportation Disaster (Road or Rail Crash) ;Hazardous Material Event (Chemical Spill);Windstorm / High Wind Events;Wildfire;		Somewhat worried	2	causing damage to where I live;harming people I care about;causing damage to my property;
248	10/21/23 8:30:51	10/21/23 8:45:25	anonymous	Doesn't matter	Yes	Cloud seeding and carbon capture pipeline ;	Carbon capture and cloud seeding, I see the planes doing it I have videos and pics of them.	Very worried		causing damage to where I live;causing damage to my business;causing damage to my property;impacting roads, bridges, and buildings in my community;harming people I care about;costing me money (missed work or injuries);Carbon capture will kill us all and crops it will reduce oxygen we need it reduces photosynthesis.;
249	10/21/23 8:46:19	10/21/23 8:51:16	anonymous	Fargo	No	Extreme Winter Storm Events (Ice or Snow Storm);Flood;Hazardous Material Event (Chemical Spill);Transportation Disaster (Road or Rail Crash) ;	No	Only a little bit worried	7	causing damage to where I live;impacting roads, bridges, and buildings in my community;costing me money (missed work or injuries);
250	10/21/23 8:45:54	10/21/23 8:51:48	anonymous	Fargo	Yes	Flood;Extreme Winter Storm Events (Ice or Snow Storm);Extreme Heat;Drought;	No	Somewhat worried	3	impacting roads, bridges, and buildings in my community;harming people I care about;
251	10/21/23 11:55:11	10/21/23 12:04:12	anonymous	Bismarck	Yes	Climate change ;Infectious Disease;Flood;Hazardous Material Event (Chemical Spill);	Crime after natural disasters	Somewhat worried	6	impacting roads, bridges, and buildings in my community;harming people I care about;Wrecking the natural environment for other species;
252	10/21/23 16:29:00	10/21/23 16:33:03	anonymous	Belfield	Yes	Extreme Winter Storm Events (Ice or Snow Storm);Hazardous Material Event (Chemical Spill);Transportation Disaster (Road or Rail Crash) ;		Very worried	1	causing damage to where I live;causing damage to my business;causing damage to my property;harming people I care about;costing me money (missed work or injuries);impacting roads, bridges, and buildings in my community;
253	10/22/23 5:43:28	10/22/23 6:19:45	anonymous	Fargo, ND	Yes	Drought;Flood;Infectious Disease;Wildfire;	Extreme weather events caused by increased atmospheric temperature due to greenhouse gas emissions.	Very worried	6	Causing the state or nation to collapse due to financial burdens that could be relieved by addressing climate change and drawing down fossil fuel use in five years. ;
254	10/23/23 3:41:58	10/23/23 4:00:08	anonymous	Williston, ND	Yes	Drought;Flood;Hail;Windstorm / High Wind Events;	Tornado or hazardous material spill	Somewhat worried	8	causing damage to where I live;causing damage to my business;causing damage to my property;harming people I care about;costing me money (missed work or injuries);impacting roads, bridges, and buildings in my community;
255	10/23/23 7:02:24	10/23/23 7:33:18	anonymous	Dickinson	Yes	Extreme Winter Storm Events (Ice or Snow Storm);Hazardous Material Event (Chemical Spill);Transportation Disaster (Road or Rail Crash) ;Civil unrest/politically motivated violence;	Politically motivated violence and threats. Already happening here	Somewhat worried	6	causing damage to where I live;causing damage to my business;causing damage to my property;impacting roads, bridges, and buildings in my community;harming people I care about;costing me money (missed work or injuries);
256	10/23/23 13:50:23	10/23/23 14:02:10	anonymous	Ward county	Unsure	Infectious Disease;Illegal drugs, let's wake up here, hello?;Windstorm / High Wind Events;Hazardous Material Event (Chemical Spill);		Only a little bit worried	7	Been through a few disasters, what help?;
257	10/26/23 8:57:44	10/26/23 9:00:28	anonymous	Esmond North Dakota	Yes	Extreme Winter Storm Events (Ice or Snow Storm);Hail;Hazardous Material Event (Chemical Spill);Wildfire;		Somewhat worried	5	harming people I care about;impacting roads, bridges, and buildings in my community;costing me money (missed work or injuries);causing damage to my property;causing damage to where I live;
258	10/29/23 13:52:36	10/29/23 14:00:34	anonymous	Bismarck	Yes	Extreme Winter Storm Events (Ice or Snow Storm);Tornados;Infectious Disease;Hazardous Material Event (Chemical Spill);	No	Very worried	4	causing damage to where I live;causing damage to my property;harming people I care about;impacting roads, bridges, and buildings in my community;costing me money (missed work or injuries);Shootings ;
259	11/14/23 9:12:03	11/14/23 9:17:53	anonymous	Bismarck, ND	Yes	Extreme Winter Storm Events (Ice or Snow Storm);Transportation Disaster (Road or Rail Crash) ;Infectious Disease;Hazardous Material Event (Chemical Spill);	radiation/nuclear	Only a little bit worried	8	causing damage to where I live;impacting roads, bridges, and buildings in my community;harming people I care about;costing me money (missed work or injuries);
260	11/14/23 16:32:43	11/14/23 16:46:19	anonymous	Bismarck	Yes	Extreme Winter Storm Events (Ice or Snow Storm);Windstorm / High Wind Events;Infectious Disease;Drought;		Somewhat worried	8	causing damage to where I live;causing damage to my property;impacting roads, bridges, and buildings in my community;harming people I care about;costing me money (missed work or injuries);
261	11/9/2023 Hard Copy Response	11/9/2023 Hard Copy Response	anonymous	Bismark	Yes		Cyber Attack	Somewhat worried	6	

ID	Start time	Completion time	Email	In which community do you live?	In general, do you think disaster events or severe storms could have a major impact on your community in the future?	Please select the top 4 hazards you think are the biggest threat to your area.	Are you worried about any potential disaster events that we did not list?	How worried are you about the possibility of your community being impacted by a disaster?	On a scale of 1-10, how prepared do you feel for a disaster? (10=very, 1=not at all)	Check all that apply: "I am worried about a disaster event..."
262	11/9/2023 Hard Copy Response	11/9/2023 Hard Copy Response	anonymous	Bismark	Yes	Drought, Extereme Winter Storm Events (Ice or Snow Storm), Hazardous Material event (Chemical Spill), Other - Cyber Attack	Cyber Attack	Somewhat worried	7	causing damage to where I live; impacting roads, bridges, and buildings in my community; harming people I care about;
263	11/9/2023 Hard Copy Response	11/9/2023 Hard Copy Response	anonymous	Burleigh County	No	Dam Failure; Drought; Extreme Winter Storm Events (Ice or Snow Storm); Windstorm/High Wind Events;	No	Only a little bit worried	6	causing damage to where I live; causing damage to my property; impacting roads, bridges, and buildings in my community; harming people I care about; costing me money (missed work or injuries)
264	11/9/2023 Hard Copy Response	11/9/2023 Hard Copy Response	anonymous	Bismark	Yes	Extreme Winter Storm Events (Ice or Snow Storm); Flood; Hazardous Material Event (Chemical Spill); Transportation Disaster (Road or Rail Crash)	No	Only a little bit worried	6	causing damage to where I live; causing damage to my property; harming people I care about

ID	When severe weather or other dangerous events happen, are there areas of your community you worry about? (Examples may include: certain access roads, intersections, bridges, levees or other infra...	Have you or anyone in your household experienced any disasters or severe storm events? (Data will remain anonymous and only used for planning purposes.)	If yes, please share your story with us. You can describe the disaster or severe event you experienced and include details such as the type of event, when it happened, where you saw damage, and ho...	What steps should the government take to reduce risks in your area? (Check all that apply.)	Attend information meetings on natural disasters	Make a household emergency plan	Prepare a home supply kit, "go bag" or store supplies	Create a buffer around your home to protect against wildfire	Purchase hazard insurance (flood, earthquake, etc.)	Make a disaster plan with your neighbors (phone tree, home checks, etc.)	Protect and strengthen your home or business structurally (i.e., elevate it to keep it dry during a flood)
1	I worry about our "forgotten" populations including those who live in rural areas, tribes, elderly, or those who do not have a strong social network in general. When it comes to my community, I worry about people first.	Yes	I have experienced many winter storms and minor flooding. Winter storms halt all activity locking myself and my family in our homes, we stockpile food and hope that our electricity does not go out. There were many times that my mom was stuck in the neighboring community as she could not get home and needed to stay in hotel rooms and continued to work long hours because other employees could not get into work. Additionally, when the snow melts my parents basement and our family friends have experienced significant flooding. Around 2008, our community had a large flood and my parents got a dumpster for everyone to use and it was full in a day.	Shelters: Emergency or Storm shelters;Debris/tree removal;Keep or expand open spaces & natural areas;Improve water quality;Maintain/improve public roads, bridges, other transportation features;Public education and outreach;	Done this	Done this	Done this	Won't do this	Won't do this	Thinking about doing this	Won't do this
2	Missouri River crossings	Yes	floods, tornados, hail, etc.	Alert/warning system;Shelters: Emergency or Storm shelters;Debris/tree removal;Build/improve flood protection;Keep or expand open spaces & natural areas;Maintain/improve public roads, bridges, other transportation features;Improve water quality;Protect natural resources;More emergency services;Public education and outreach;	Done this	Done this	Plan to do in the future	Done this	Done this	Plan to do in the future	Done this
3		No		Shelters: Emergency or Storm shelters;Alert/warning system;Build/improve flood protection;	Done this	Plan to do in the future	Plan to do in the future	Can't do this	Thinking about doing this	Thinking about doing this	Plan to do in the future
4		No		Alert/warning system;Debris/tree removal;Build/improve flood protection;Keep or expand open spaces & natural areas;Maintain/improve public roads, bridges, other transportation features;Protect natural resources;More emergency services;Public education and outreach;	Thinking about doing this	Thinking about doing this	Thinking about doing this	Won't do this	Thinking about doing this	Plan to do in the future	Done this
5		Yes		Shelters: Emergency or Storm shelters;More emergency services;Maintain/improve public roads, bridges, other transportation features;Public education and outreach;	Done this	Done this	Done this	Plan to do in the future	Done this	Thinking about doing this	Can't do this
6	Campgrounds, parks, lakes, subdivisions-lack of storm sirens, government agencies and total lack of preparedness at local level-emergency management hasn't a clue.	Yes	Tornadoes in Watford City and wildlfires during last drought. Friends hurt on lake or in badlands and agencies ill equipped, unprepared to handle.	More emergency services;Alert/warning system;Keep or expand open spaces & natural areas;Maintain/improve public roads, bridges, other transportation features;Protect natural resources;Public education and outreach;Better collaboration with all public safety groups, volunteers, and nonprofits ;	Plan to do in the future	Done this	Done this	Done this	Won't do this	Done this	Thinking about doing this
7	The elderly in their homes and care facilities and first responders abilities when stretched during a disaster	Yes	I was a police officer in CA. I worked during the Oakland hills fires and numerous earthquakes, including the Loma Prieta quake. I've also worked during numerous civil unrest situations, which has a similar affect on communities to natural disasters.	Alert/warning system;Shelters: Emergency or Storm shelters;Debris/tree removal;Build/improve flood protection;Keep or expand open spaces & natural areas;Improve water quality;Maintain/improve public roads, bridges, other transportation features;Protect natural resources;More emergency services;Public education and outreach;Community safety drills;	Done this	Done this	Done this	Done this	Done this	Done this	Plan to do in the future
8	Grocery stores, roads, personal property	Yes	Lots of flooding on the east side of the state, along with many summer storms damaging crops, homes, businesses	Alert/warning system;Shelters: Emergency or Storm shelters;More emergency services;Maintain/improve public roads, bridges, other transportation features;	Done this	Done this	Done this	Done this	Won't do this	Done this	Done this
9		No		Alert/warning system;Shelters: Emergency or Storm shelters;Debris/tree removal;Maintain/improve public roads, bridges, other transportation features;More emergency services;Public education and outreach;	Plan to do in the future	Plan to do in the future	Plan to do in the future	Thinking about doing this	Plan to do in the future	Thinking about doing this	Plan to do in the future
10	Downtown Bismarck along the railroad. The hospitals are near the tracks.	No		Public education and outreach;Shelters: Emergency or Storm shelters;	Thinking about doing this	Thinking about doing this	Thinking about doing this	Can't do this	Done this		Thinking about doing this
11	Ambulance and Fire Halls and vehicles	Yes	Three day blizzard, no power, roads blocked, no access to emergency vehicles	More emergency services;	Done this	Plan to do in the future	Plan to do in the future	Thinking about doing this	Thinking about doing this	Done this	Thinking about doing this
12	The elderly may be difficult to reach in the event of an emergency.	No		More emergency services;	Done this	Done this	Done this	Can't do this	Done this	Done this	Done this
13		Yes		Alert/warning system;Shelters: Emergency or Storm shelters;Debris/tree removal;Maintain/improve public roads, bridges, other transportation features;Public education and outreach;	Won't do this	Thinking about doing this	Plan to do in the future	Done this	Thinking about doing this	Thinking about doing this	Can't do this
14		Yes	Flooding	Shelters: Emergency or Storm shelters;Alert/warning system;Improve water quality;Maintain/improve public roads, bridges, other transportation features;More emergency services;	Plan to do in the future	Plan to do in the future	Plan to do in the future	Thinking about doing this	Thinking about doing this	Thinking about doing this	Thinking about doing this
15	no	Yes	sever winter storms where the electricity has been out for extended number of days.	unsure if this is avoidable.;	Done this	Thinking about doing this	Done this	Won't do this	Done this	Done this	Won't do this
16				Alert/warning system;Shelters: Emergency or Storm shelters;Improve water quality;Keep or expand open spaces & natural areas;Public education and outreach;	Done this	Done this	Done this	Can't do this	Done this	Done this	Done this
17		Yes		Alert/warning system;Shelters: Emergency or Storm shelters;Debris/tree removal;Build/improve flood protection;Maintain/improve public roads, bridges, other transportation features;Public education and outreach;	Done this	Done this	Plan to do in the future	Thinking about doing this	Thinking about doing this	Plan to do in the future	Plan to do in the future
18		Yes	In my youth in Oakes, ND: 1966 Blizzard; Wind Sheer Aug 1977; Winter of 77-78, In the 1980's - 2012, every flood or winter event I was there during and after as a part of the NDNG. Twice while at conferences in New Orleans, La and Virginia Beach, VA I was caught in hurricanes and assisted where I could during and after.	Maintain/improve public roads, bridges, other transportation features;Protect natural resources;Public education and outreach;More emergency services;Alert/warning system;Shelters: Emergency or Storm shelters;Debris/tree removal;Build/improve flood protection;Keep or expand open spaces & natural areas;Improve water quality;#1 is Public Education of what they need to do to be prepared;	Plan to do in the future	Done this	Done this	Plan to do in the future	Won't do this	Thinking about doing this	Done this

ID	When severe weather or other dangerous events happen, are there areas of your community you worry about? (Examples may include: certain access roads, intersections, bridges, levees or other infra...	Have you or anyone in your household experienced any disasters or severe storm events? (Data will remain anonymous and only used for planning purposes.)	If yes, please share your story with us. You can describe the disaster or severe event you experienced and include details such as the type of event, when it happened, where you saw damage, and ho...	What steps should the government take to reduce risks in your area? (Check all that apply.)	Attend information meetings on natural disasters	Make a household emergency plan	Prepare a home supply kit, "go bag" or store supplies	Create a buffer around your home to protect against wildfire	Purchase hazard insurance (flood, earthquake, etc.)	Make a disaster plan with your neighbors (phone tree, home checks, etc.)	Protect and strengthen your home or business structurally (i.e., elevate it to keep it dry during a flood)
19	Not directly	No		Alert/warning system;Shelters: Emergency or Storm shelters;Debris/tree removal;Build/improve flood protection;Keep or expand open spaces & natural areas;More emergency services;Public education and outreach;	Done this	Done this	Plan to do in the future	Can't do this	Can't do this	Thinking about doing this	Can't do this
20	Campgrounds in the area, emergency responder stations, and community centers.	Yes	Spring winter storm of 2022. No power for 8 days, limited access to amenities, and I live in a very rural area. Some homes Nw of Williston went without power for 30+ days. While I appreciated all the hard work that the power crews did, is there a way to better prepare for such an event? Grateful that the ARC was a place to seek refuge for a hot shower.	Alert/warning system;Shelters: Emergency or Storm shelters;Debris/tree removal;Keep or expand open spaces & natural areas;Improve water quality;Maintain/improve public roads, bridges, other transportation features;Protect natural resources;More emergency services;Public education and outreach;	Plan to do in the future	Done this	Done this	Done this	Can't do this	Plan to do in the future	Can't do this
21	Highway 2 and county highway 1 Railroad going through town	Yes		Alert/warning system;Debris/tree removal;Build/improve flood protection;Improve water quality;Maintain/improve public roads, bridges, other transportation features;Protect natural resources;							
22	Last year during that winter storm that took down power lines we lost power for 3 days, heated our home with a kerosene heater, to keep the pipes from freezing. Definitely wasn't very safe. I wish we had the option for gas heat. Or even a fireplace.	Yes	I've lived here for 10 years lost power multiple times for several days. Both times I had to sleep in my vehicle with the engine running over night.	Grants for home Generators or gas utilities, ability to burn wood for heat in town. ;	Done this	Done this	Done this				
23	Reeder is an older town with lots of old wood building. It is also partially surrounded by old shelter belts with many dead trees. A Wildland Fire could very quickly get beyond the ability of the local fire departments to manage even with mutual aid.	Yes	On several occasions in the past two winters, I have had to shelter in place during winter weather. My family has had to shelter at home when it was impossible to leave town. No real harm happened in those event but if there had been some kind of emergency, it would have been very difficult for responders to get to us.	Maintain/improve public roads, bridges, other transportation features;Improve winter weather mitigation and response capabilities. Adams County has only the most rudimentary and make shift capability for maintaining services during severe winter weather. They rely on privately owned snowmobiles to transport hospital staff to work in Hettinger. Outside of Hettinger, there is no resource. Local fire/Rescue/EMS units need to be helped in obtaining tracked units that can move in deep snow.;	Done this	Done this	Done this	Done this	Thinking about doing this	Thinking about doing this	Plan to do in the future
24	No	Yes	Spring storm closed roads and stores, people in hotels and truck drivers where stuck with no food or stuck in trucks in truck stops. Not really an impact to me as I prepared when we were warned. Local police were very informative through FB which was helpful.	Alert/warning system;Shelters: Emergency or Storm shelters;Maintain/improve public roads, bridges, other transportation features;More emergency services;Public education and outreach;Having the ability to get to stuck travelers. ;		Thinking about doing this	Thinking about doing this				
25	Low income/homeless/vulnerable populations	Yes	Flood	Build/improve flood protection;More emergency services;Improve water quality;	Thinking about doing this	Done this	Done this	Can't do this	Done this	Done this	Won't do this
26	Rivers	Yes	House we lived in had water in basement due to flooding.	Alert/warning system;Shelters: Emergency or Storm shelters;Debris/tree removal;Build/improve flood protection;Keep or expand open spaces & natural areas;Maintain/improve public roads, bridges, other transportation features;Protect natural resources;Public education and outreach;	Done this	Thinking about doing this	Thinking about doing this	Won't do this	Done this	Can't do this	Can't do this
27	I do have a area of concern	No		Maintain/improve public roads, bridges, other transportation features;Public education and outreach;Debris/tree removal;Alert/warning system;	Plan to do in the future	Done this	Plan to do in the future	Thinking about doing this	Won't do this	Can't do this	Won't do this
28		Yes		Public education and outreach;		Done this	Done this	Done this	Done this	Done this	
29	Schools near the rail line, all but one road across town being possibly blocked by a rail line.	No		Alert/warning system;Shelters: Emergency or Storm shelters;Maintain/improve public roads, bridges, other transportation features;More emergency services;Public education and outreach;	Won't do this	Done this	Done this	Won't do this	Thinking about doing this	Won't do this	Won't do this
30	Homeless	No		Alert/warning system;Shelters: Emergency or Storm shelters;Public education and outreach;	Thinking about doing this	Done this	Thinking about doing this		Thinking about doing this		
31	no	Yes	tornado damaged camper and pickup in my yard and fence lines nearby from downed trees blizzard broke power poles lost electricity for 3 days twice blizzard blocked roadway for 2-3 days careless person burning garbage caused fire fueled by high winds caused major grassland fire river backed up due to ice jam flooded large area damaged many homes and fields 3 times	Shelters: Emergency or Storm shelters;Alert/warning system;Debris/tree removal;More emergency services;Public education and outreach;Maintain/improve public roads, bridges, other transportation features;	Done this	Done this	Done this	Can't do this	Won't do this	Thinking about doing this	Won't do this
32		Yes	I've been impacted by wind and ice storms that break off trees, blocking roads, breaking electrical lines, or tearing down fences. It was more inconvenient than anything, as I keep a good supply of necessary food and medicine in stock.	Debris/tree removal;Keep or expand open spaces & natural areas;Maintain/improve public roads, bridges, other transportation features;Public education and outreach;	Won't do this	Thinking about doing this	Thinking about doing this	Won't do this	Won't do this	Won't do this	Won't do this
33	Children, elderly, disabled	No		Alert/warning system;Shelters: Emergency or Storm shelters;Maintain/improve public roads, bridges, other transportation features;	Done this	Plan to do in the future	Plan to do in the future	Thinking about doing this	Plan to do in the future	Plan to do in the future	Plan to do in the future
34	The elderly	No		Alert/warning system;Shelters: Emergency or Storm shelters;	Done this	Thinking about doing this	Thinking about doing this	Can't do this	Won't do this	Can't do this	Won't do this
35	Young children, elderly populations, disabled persons	Yes	I was snowed in after a severe winter storm and could not get out of the parking lot of my building to get food. My neighbor was very sick and needed to go to the emergency room during this event and had to call someone from outside of our building to bring her it was dangerous.	Alert/warning system;Shelters: Emergency or Storm shelters;Debris/tree removal;Build/improve flood protection;Keep or expand open spaces & natural areas;Improve water quality;Maintain/improve public roads, bridges, other transportation features;Protect natural resources;More emergency services;Public education and outreach;	Done this	Won't do this	Plan to do in the future	Can't do this	Plan to do in the future	Done this	Can't do this
36	Our community tends to avoid addressing inequities—especially poverty and other social factors. Any physical damage will harm folks experiencing these issues more severely than those of us more privileged. I am not sure our city leadership would address these issues or rather see it as an opportunity to re-develop poorer and working class neighborhoods into high priced housing.	Yes	My experience did not occur in ND and involves working in response, facilitating recovery, supporting preparedness efforts (CBO coalition building), and evaluating mitigation plans. I've experienced tornadoes, pandemic, flooding, severe winter storms, earthquakes, domestic terroristic bombing, wildfire, and severe thunderstorms complete with damaging hail/lightning.	Build/improve flood protection;Keep or expand open spaces & natural areas;Maintain/improve public roads, bridges, other transportation features;Protect natural resources;Public education and outreach;Shelters: Emergency or Storm shelters;Improve water quality;Debris/tree removal;Alert/warning system;	Done this	Done this	Done this	Can't do this	Done this	Done this	Can't do this
37	Access roads to the hospital, and roads that the fire department and police department rely on for support services.	Yes	This last winter a roadway remained blocked for an extended period of time in Dickinson. It was only a few blocks away from the fire station, police department.	Shelters: Emergency or Storm shelters;Maintain/improve public roads, bridges, other transportation features;More emergency services;	Done this	Done this	Done this	Can't do this	Thinking about doing this	Thinking about doing this	Can't do this
38		No		Shelters: Emergency or Storm shelters;Keep or expand open spaces & natural areas;Maintain/improve public roads, bridges, other transportation features;Protect natural resources;Public education and outreach;	Won't do this	Done this	Done this	Can't do this	Plan to do in the future	Thinking about doing this	Can't do this
39	access roads, intersections, bridges, levees or other infrastructure; important buildings like hospitals, fire stations, or community centers; or specific populations like young children or the elderly	No		Build/improve flood protection;Maintain/improve public roads, bridges, other transportation features;More emergency services;Public education and outreach;Alert/warning system;Shelters: Emergency or Storm shelters;Debris/tree removal;	Done this	Plan to do in the future	Plan to do in the future	Won't do this	Won't do this	Won't do this	Done this
40	Vulnerable populations	Yes	Hail and wind damage	Public education and outreach;More emergency services;Protect natural resources;Maintain/improve public roads, bridges, other transportation features;Improve water quality;Shelters: Emergency or Storm shelters;Alert/warning system;	Done this	Done this	Plan to do in the future	Won't do this	Won't do this	Won't do this	Won't do this

ID	When severe weather or other dangerous events happen, are there areas of your community you worry about? (Examples may include: certain access roads, intersections, bridges, levees or other infra...	Have you or anyone in your household experienced any disasters or severe storm events? (Data will remain anonymous and only used for planning purposes.)	If yes, please share your story with us. You can describe the disaster or severe event you experienced and include details such as the type of event, when it happened, where you saw damage, and ho...	What steps should the government take to reduce risks in your area? (Check all that apply.)	Attend information meetings on natural disasters	Make a household emergency plan	Prepare a home supply kit, "go bag" or store supplies	Create a buffer around your home to protect against wildfire	Purchase hazard insurance (flood, earthquake, etc.)	Make a disaster plan with your neighbors (phone tree, home checks, etc.)	Protect and strengthen your home or business structurally (i.e., elevate it to keep it dry during a flood)
41	Impacts to Emergency Services, trailer parks, schools	Yes		Debris/tree removal;Alert/warning system;Shelters: Emergency or Storm shelters;Keep or expand open spaces & natural areas;Maintain/improve public roads, bridges, other transportation features;Protect natural resources;Public education and outreach;	Thinking about doing this	Done this	Plan to do in the future	Won't do this	Thinking about doing this	Won't do this	Thinking about doing this
42	1806 closing, I worry about the new high school and Starion complex so close to the refinery. So many children if an event happened. The main access road from the fire department/ambulances to the high school or Starion could easily be blocked.	Yes	Tornado, flooding, prairie fire (I've been around for a while - ha.)	Alert/warning system;Shelters: Emergency or Storm shelters;Protect natural resources;Public education and outreach;Better city planning. Does it really make sense to have all the kids 12-18 within a mile of a refinery during the day?;	Plan to do in the future	Done this	Done this	Done this	Won't do this	Done this	Done this
43	Roads being cleared for emergency services.	Yes	Natural Gas line broke during the coldest days of the winter. We were without heat for a couple of days. We were lucky enough to have access to electric heaters to keep our pipes from freezing and the family warm enough until the pipe was fixed. But we would have been in trouble if it would have been another day.	Maintain/improve public roads, bridges, other transportation features;Public education and outreach;Alert/warning system;	Thinking about doing this	Plan to do in the future	Plan to do in the future	Can't do this	Thinking about doing this	Thinking about doing this	Can't do this
44	Roads out of town to towns such as Cassleton and Fargo. Those are the only ways we can get food and groceries.	Yes	Many stories including damaging hail, damaging wind, tornado, blizzards, Winter storms, ice, freezing rain, ect.	Protect natural resources;Add more shelter belts in and around town! There are some spaces that are so open that you can see for miles. The wind knocks you off the road. ;	Won't do this	Done this	Done this	Won't do this	Can't do this	Done this	Can't do this
45	I'm not worried	Yes	Flood in the RRV in 97. Took in people. Delt with it.	Let people take care of it themselves. No government regulations preventing them to do so. ;	Won't do this	Done this	Done this	Done this	Won't do this	Won't do this	Done this
46	roads	Yes	We were flooded a few year's back so bad it shut us down for about 3month's and it was county that messed with the 10 mile lake that is down from dazey a few miles.	Alert/warning system;Build/improve flood protection;Keep or expand open spaces & natural areas;Maintain/improve public roads, bridges, other transportation features;Public education and outreach;More emergency services;Debris/tree removal;	Done this	Done this	Done this	Done this	Done this	Done this	Done this
47	No	Yes	1997 flood damaged home and rentals	Public education and outreach;Build/improve flood protection;	Won't do this	Thinking about doing this	Won't do this	Won't do this	Done this		Can't do this
48	Transportation, general well-being of community - access to food and heathcare	Yes		Protect natural resources;Maintain/improve public roads, bridges, other transportation features;Shelters: Emergency or Storm shelters;							
49	Access roads, young children or elderly, airport	No		Alert/warning system;Shelters: Emergency or Storm shelters;Debris/tree removal;Build/improve flood protection;Improve water quality;Protect natural resources;Public education and outreach;Maintain/improve public roads, bridges, other transportation features;	Thinking about doing this	Thinking about doing this				Thinking about doing this	
50	In case of a tornado, I would always worry about people, and possibly children, in the homes in its path. Very remote, but I do include a train derailment/hazardous material event in my emergency plan, and how I would handle it if sirens went off at night or I was otherwise alerted to that danger.	Yes	I was living in Fargo during the '57 tornado. As a 3 1/2 yr. old, I have lasting memories of the event itself, which gave me a healthy respect for tornadoes. Afterwards, our family always had a plan of where to go in case of a tornado and even had tornado drills. We also knew where the nearest bomb shelter was (something almost unheard of nowadays). I helped in the flood of 2009, and realized the value and strength of working together as a community.	Alert/warning system;Shelters: Emergency or Storm shelters;Keep or expand open spaces & natural areas;Improve water quality;Maintain/improve public roads, bridges, other transportation features;Protect natural resources;	Won't do this	Done this	Done this	Won't do this	Won't do this	Won't do this	Won't do this
51		No		Alert/warning system;Shelters: Emergency or Storm shelters;Debris/tree removal;Build/improve flood protection;Improve water quality;Maintain/improve public roads, bridges, other transportation features;More emergency services;Keep or expand open spaces & natural areas;Protect natural resources;Public education and outreach;	Thinking about doing this	Plan to do in the future	Thinking about doing this	Can't do this	Won't do this	Won't do this	Won't do this
52	There are area to avoid due to flooding or standing water.	Yes	The flood of 2011 displaced us permanently.	Alert/warning system;Public education and outreach;	Done this	Done this	Done this	Thinking about doing this	Won't do this	Thinking about doing this	Done this
53		No		Alert/warning system;Shelters: Emergency or Storm shelters;Maintain/improve public roads, bridges, other transportation features;	Thinking about doing this	Plan to do in the future	Plan to do in the future	Plan to do in the future	Won't do this	Thinking about doing this	Done this
54	Floodplain	Yes	Could not drive to work because of snowstorm	Alert/warning system;Shelters: Emergency or Storm shelters;Debris/tree removal;Build/improve flood protection;Keep or expand open spaces & natural areas;Improve water quality;Maintain/improve public roads, bridges, other transportation features;Protect natural resources;More emergency services;Public education and outreach;Erosion control;	Thinking about doing this	Done this	Done this	Thinking about doing this	Can't do this	Can't do this	Can't do this
55	I fear being isolated from next level care while roads are closed	Yes	I hauled equipment for Katrina Rita clean up, Being snowed in during recent blizzards	Public education and outreach;Build community. Neighbor helping neighbors ;	Thinking about doing this	Done this	Done this	Done this	Done this	Thinking about doing this	Can't do this
56	Impassable roads, power loss, no emergency vehicle access	Yes	Snow and ice made roads impassable, coun't get out for 4 days.	Debris/tree removal;More emergency services;Protect natural resources;Maintain/improve public roads, bridges, other transportation features;Improve water quality;	Plan to do in the future	Done this	Done this	Plan to do in the future	Done this	Plan to do in the future	Plan to do in the future
57	Water treatment and wastewater services	No		Improve water quality;	Thinking about doing this	Done this	Done this	Thinking about doing this	Thinking about doing this	Done this	Won't do this
58		Yes	Flooding due to City of Dickinson planning/ stupidity.	Alert/warning system;Shelters: Emergency or Storm shelters;Build/improve flood protection;Keep or expand open spaces & natural areas;Maintain/improve public roads, bridges, other transportation features;Protect natural resources;	Done this	Done this	Done this	Thinking about doing this	Done this	Done this	Thinking about doing this
59		Yes	The two floods that hit Bismarck/Mandan over the last 15 years or so. It seems very little has been done to prepare for anther flood event in this area.	Build/improve flood protection;Improve water quality;	Thinking about doing this	Plan to do in the future	Plan to do in the future	Can't do this	Can't do this	Plan to do in the future	Can't do this
60	infrastructure, utilities	No		Maintain/improve public roads, bridges, other transportation features;Public education and outreach;Shelters: Emergency or Storm shelters;	Plan to do in the future	Done this	Done this	Done this	Plan to do in the future	Plan to do in the future	Done this
61	Communication reaching all people; mobile home courts; elderly people living alone	Yes	Flooding experienced as a young child in Minot-not damage to our home, but we opened up our home to others. Lingering memories of high water, detours, stories of people losing many things, and feelings of dread that I have when hearing about other floods.	Shelters: Emergency or Storm shelters;Maintain/improve public roads, bridges, other transportation features;Protect natural resources;- reduce dependence on fossil fuels. - improve drainage of water in low-lying areas. - quit building on the river. - plan to help people who might be out of homes for long periods;	Plan to do in the future	Done this	Thinking about doing this	Won't do this	Thinking about doing this	Thinking about doing this	Can't do this
62		Yes	The flood of 97 in Grand Forks lost many items and had to redo my housing.	Alert/warning system;Shelters: Emergency or Storm shelters;Protect natural resources;Keep or expand open spaces & natural areas;Public education and outreach;	Done this	Plan to do in the future	Thinking about doing this		Done this		
63	Fire stations, Ambulance Service Medical Facilities	No		Alert/warning system;Shelters: Emergency or Storm shelters;Maintain/improve public roads, bridges, other transportation features;	Done this	Done this	Won't do this	Won't do this	Done this	Done this	Won't do this

ID	When severe weather or other dangerous events happen, are there areas of your community you worry about? (Examples may include: certain access roads, intersections, bridges, levees or other infra...	Have you or anyone in your household experienced any disasters or severe storm events? (Data will remain anonymous and only used for planning purposes.)	If yes, please share your story with us. You can describe the disaster or severe event you experienced and include details such as the type of event, when it happened, where you saw damage, and ho...	What steps should the government take to reduce risks in your area? (Check all that apply.)	Attend information meetings on natural disasters	Make a household emergency plan	Prepare a home supply kit, "go bag" or store supplies	Create a buffer around your home to protect against wildfire	Purchase hazard insurance (flood, earthquake, etc.)	Make a disaster plan with your neighbors (phone tree, home checks, etc.)	Protect and strengthen your home or business structurally (i.e., elevate it to keep it dry during a flood)
64	Isolated areas with no actual protection...	Yes	As a child tornadoes swept through periodically Hail would destroy crops Overspray of surrounding fields by crop sprayers...we lost thousands of plum and apple trees to errant spraying	Maintain/improve public roads, bridges, other transportation features;Stay off of our property and forbid eminent domain for millions of political favors and cash...AND YES IT IS HAPPENING;	Done this	Done this	Done this	Can't do this	Done this	Done this	Done this
65	Computer failure	No		Alert/warning system;Shelters: Emergency or Storm shelters;Debris/tree removal;	Won't do this	Won't do this	Won't do this	Won't do this	Won't do this	Won't do this	Won't do this
66		No		Maintain/improve public roads, bridges, other transportation features;More emergency services;	Done this	Done this	Done this	Done this	Thinking about doing this	Done this	Thinking about doing this
67	Only one road into or out of my property is plowed in the winter. The other road is never plowed. I would feel safer if there were two access roads.	Yes	During the winter of 2022-2023 we were snowed in several times.	Protect natural resources;Plow more roads;	Won't do this	Plan to do in the future	Plan to do in the future	Done this	Won't do this	Won't do this	Done this
68		Yes	Loss of power for days.	Quit interfering in areas that private sector should be driving force;	Won't do this	Done this	Plan to do in the future	Plan to do in the future	Won't do this	Thinking about doing this	Won't do this
69	We have levees, railways, major highway, bridges, very few community centers to house large portion of the community, many elderly housing units, and many parts of the city located close to major thorough fairs.	Yes	We experienced an over land flood with 6 feet of water in our basement.	Alert/warning system;Shelters: Emergency or Storm shelters;Build/improve flood protection;Improve water quality;Maintain/improve public roads, bridges, other transportation features;Protect natural resources;More emergency services;Public education and outreach;Have plans for, make plans for, and educate the public for all natural disasters. ;	Plan to do in the future	Plan to do in the future	Plan to do in the future			Plan to do in the future	Thinking about doing this
70	River flooding	No		Alert/warning system;Shelters: Emergency or Storm shelters;Debris/tree removal;Build/improve flood protection;Maintain/improve public roads, bridges, other transportation features;More emergency services;Public education and outreach;	Thinking about doing this	Done this	Plan to do in the future	Can't do this	Done this	Won't do this	Won't do this
71	River road. Also the Washington Broadway to Front street area	No		Debris/tree removal;Protect natural resources;Keep or expand open spaces & natural areas;Build/improve flood protection;	Thinking about doing this		Done this				
72	Never gave it a thought.	Yes	Numerous tornadoes during the 70's and 80's and clean up afterwards. None so severe that caused death, just buildings destroyed or damaged along with trees. Just made me more aware and prepared for such events. Helped prep and stack sandbags for floods in the Fargo and Davenport in 2009 and 2011. How has it impacted me? It raised my ire towards the Army Corp of Engineers and FEMA. I don'tt trust either one. There could have been several other options that would have cost less aNDDEStroyed less other than the diversion and dikes around small town that are going to have a hell of a time paying for them - especially the way those organizations drag their feet accomplishing anything in a timely manner. Many people other than myself believe they are using this flooding situation as a way to recuperate their dwindled coffers.	Alert/warning system;Debris/tree removal;	Done this	Plan to do in the future	Plan to do in the future	Won't do this	Thinking about doing this	Won't do this	Won't do this
73	Hospital nursing homes first responders	Yes	Tornado Mostly public services and neighborhoods	Alert/warning system;Debris/tree removal;	Won't do this	Thinking about doing this	Thinking about doing this	Can't do this	Won't do this	Thinking about doing this	Won't do this
74	I worry about drivers who were told not to go out in bad weather, out and dying or getting injured.	No		Alert/warning system;Shelters: Emergency or Storm shelters;Debris/tree removal;Build/improve flood protection;Keep or expand open spaces & natural areas;Improve water quality;Maintain/improve public roads, bridges, other transportation features;Protect natural resources;More emergency services;Public education and outreach;	Plan to do in the future	Done this	Done this	Thinking about doing this	Done this	Won't do this	Thinking about doing this
75		Yes	Significant fire at neighboring landfill 3 years ago. Smoke damage, burned trees and grass. I've also experienced significant neurological health problems since, that have the possibility of toxic exposure as a cause. The department of environmental quality significantly tried to downplay the event. Giving me a false impression of safety.	Alert/warning system;Improve water quality;Protect natural resources;More emergency services;Public education and outreach;	Won't do this	Thinking about doing this	Done this	Done this	Can't do this	Thinking about doing this	Done this
76	No	Yes	Flood, numerous blizzards, extreme heat,tornadoes, microbursts,fires, hail storms.	Build/improve flood protection;Alert/warning system;Maintain/improve public roads, bridges, other transportation features;							
77		Yes	Hail damage	Alert/warning system;							
78		Yes		Shelters: Emergency or Storm shelters;Debris/tree removal;Maintain/improve public roads, bridges, other transportation features;Protect natural resources;	Thinking about doing this	Done this	Done this	Can't do this	Can't do this	Done this	Can't do this
79	The disabled and elderly	Yes	A blizzard at least once a winter. Being in a wheelchair and a non driver makes preperation and cleanup complicated	Alert/warning system;Shelters: Emergency or Storm shelters;Build/improve flood protection;Debris/tree removal;Maintain/improve public roads, bridges, other transportation features;More emergency services;Public education and outreach;Keep or expand open spaces & natural areas;	Done this	Plan to do in the future	Done this	Can't do this	Won't do this	Plan to do in the future	Can't do this
80	Homeless population	Yes		Alert/warning system;Shelters: Emergency or Storm shelters;Debris/tree removal;Build/improve flood protection;Keep or expand open spaces & natural areas;Improve water quality;Maintain/improve public roads, bridges, other transportation features;Protect natural resources;More emergency services;Public education and outreach;	Thinking about doing this	Plan to do in the future	Plan to do in the future	Can't do this	Can't do this	Plan to do in the future	Can't do this
81		Yes	Tornado destroyed my childhood home.	Alert/warning system;Shelters: Emergency or Storm shelters;Maintain/improve public roads, bridges, other transportation features;More emergency services;	Thinking about doing this	Thinking about doing this	Thinking about doing this	Thinking about doing this	Plan to do in the future	Thinking about doing this	Thinking about doing this
82		No		Alert/warning system;Shelters: Emergency or Storm shelters;Build/improve flood protection;	Won't do this	Plan to do in the future	Plan to do in the future	Won't do this	Thinking about doing this	Thinking about doing this	Thinking about doing this
83	I worry about the homeless population and all other vulnerable people (young, elderly, disabled, etc).	No		Build/improve flood protection;Keep or expand open spaces & natural areas;Improve water quality;Maintain/improve public roads, bridges, other transportation features;Protect natural resources;More emergency services;Public education and outreach;Better access to mental and physical healthcare;	Thinking about doing this	Plan to do in the future	Plan to do in the future	Can't do this	Can't do this	Won't do this	Can't do this
84	None	No		Alert/warning system;Debris/tree removal;	Won't do this	Thinking about doing this	Thinking about doing this	Won't do this	Won't do this	Won't do this	Won't do this
85	Roads	No		Build/improve flood protection;Maintain/improve public roads, bridges, other transportation features;	Won't do this	Thinking about doing this	Thinking about doing this	Won't do this	Can't do this	Thinking about doing this	Can't do this

ID	When severe weather or other dangerous events happen, are there areas of your community you worry about? (Examples may include: certain access roads, intersections, bridges, levees or other infra...	Have you or anyone in your household experienced any disasters or severe storm events? (Data will remain anonymous and only used for planning purposes.)	If yes, please share your story with us. You can describe the disaster or severe event you experienced and include details such as the type of event, when it happened, where you saw damage, and ho...	What steps should the government take to reduce risks in your area? (Check all that apply.)	Attend information meetings on natural disasters	Make a household emergency plan	Prepare a home supply kit, "go bag" or store supplies	Create a buffer around your home to protect against wildfire	Purchase hazard insurance (flood, earthquake, etc.)	Make a disaster plan with your neighbors (phone tree, home checks, etc.)	Protect and strengthen your home or business structurally (i.e., elevate it to keep it dry during a flood)
86	Especially with the winter storms, emergency service access	Yes	This is minor but we had a downpour and just in the mile drive home I almost drowned my car because the system couldn't keep up with draining the streets	Shelters: Emergency or Storm shelters;Maintain/improve public roads, bridges, other transportation features;More emergency services;	Thinking about doing this	Done this	Done this	Can't do this	Thinking about doing this	Thinking about doing this	Can't do this
87		No		Keep or expand open spaces & natural areas;Protect natural resources;Public education and outreach;	Thinking about doing this	Thinking about doing this	Done this	Can't do this	Won't do this	Won't do this	Can't do this
88	Underpasses, hospitals	No		Alert/warning system;Shelters: Emergency or Storm shelters;Debris/tree removal;Improve water quality;	Thinking about doing this	Plan to do in the future	Plan to do in the future	Can't do this	Done this	Plan to do in the future	Can't do this
89	Low lying land by the river.	Yes	The flooding and turmoil caused in 2011.	Shelters: Emergency or Storm shelters;Maintain/improve public roads, bridges, other transportation features;Build/improve flood protection;	Done this	Done this	Plan to do in the future	Thinking about doing this	Done this	Thinking about doing this	Won't do this
90	underpass filling with water	No		Alert/warning system;Build/improve flood protection;Improve water quality;Maintain/improve public roads, bridges, other transportation features;	Done this	Done this	Plan to do in the future	Won't do this	Won't do this	Plan to do in the future	Won't do this
91		No		Shelters: Emergency or Storm shelters;Protect natural resources;More emergency services;Keep or expand open spaces & natural areas;	Thinking about doing this	Plan to do in the future	Plan to do in the future	Can't do this	Won't do this	Thinking about doing this	Plan to do in the future
92	Disabled and the things listed above.	Yes	Blizzards, drought, hail, and high winds I have experienced. I have lost income because of having to stay home because of the snow and temperatures.	Alert/warning system;Build/improve flood protection;Improve water quality;More emergency services;	Done this	Plan to do in the future	Done this	Won't do this	Won't do this	Won't do this	Won't do this
93	All major roadways	No		Alert/warning system;Build/improve flood protection;Maintain/improve public roads, bridges, other transportation features;	Done this	Plan to do in the future	Plan to do in the future	Thinking about doing this	Done this	Plan to do in the future	Plan to do in the future
94	Major roadways	Yes	A tornado and strong winds caused severe property damage to foliage in my yard which caused damage to my garage.	Debris/tree removal;Alert/warning system;Build/improve flood protection;Maintain/improve public roads, bridges, other transportation features;	Done this	Thinking about doing this	Done this	Can't do this	Done this	Thinking about doing this	Thinking about doing this
95	Medically fragile individuals who rely on oxygen support; individuals with disabilities who may have unique health and transportation needs.	No	Have never experienced a storm when we weren't able to manage the risk or impact for a brief period of time.	Alert/warning system;Shelters: Emergency or Storm shelters;Public education and outreach;Improve water quality;More emergency services;	Thinking about doing this	Done this	Done this	Thinking about doing this	Done this	Plan to do in the future	Won't do this
96	bridges over the missouri river, airport, railroad tracks	Yes		Alert/warning system;Maintain/improve public roads, bridges, other transportation features;Improve water quality;water and fuel storage capacity;Keep or expand open spaces & natural areas;	Done this	Done this	Thinking about doing this	Done this	Done this	Plan to do in the future	Done this
97	People in poverty, especially those living in trailer homes or old rundown homes that may not hold up to high winds or heavy snows. Those in poverty don't have the means to be prepared ahead of time or make repairs after an event.	No		Shelters: Emergency or Storm shelters;Protect natural resources;Public education and outreach;Maintain/improve public roads, bridges, other transportation features;	Thinking about doing this	Plan to do in the future	Done this	Can't do this	Done this	Thinking about doing this	Can't do this
98	Gravel roads in our Townships are very soft in the spring and it is difficult at times to move larger farm equipment to fields on road that are closed or have large ruts and frost heaves in them. Extreme weather also impacts the ranching business we operate - livestock health and the amount of forage available to feed them.	Yes	The ice storm of 1997 had an impact on our livestock. Drought and excess rain has also impacted us in the past.	Maintain/improve public roads, bridges, other transportation features;	Done this	Done this	Done this	Can't do this	Won't do this	Won't do this	Done this
99		No		Alert/warning system;Shelters: Emergency or Storm shelters;Debris/tree removal;Build/improve flood protection;Keep or expand open spaces & natural areas;Improve water quality;Maintain/improve public roads, bridges, other transportation features;Protect natural resources;More emergency services;Public education and outreach;		Thinking about doing this	Thinking about doing this		Thinking about doing this		
100	No	Yes	Flood event which made my decision to purchase a home in a protected area.	Build/improve flood protection;Maintain/improve public roads, bridges, other transportation features;	Thinking about doing this	Done this	Plan to do in the future	Can't do this	Won't do this	Won't do this	Plan to do in the future
101	Underpass	Yes	Tornado demolished house, still lived in it 2 yrs later, as we couldn't get insurance to step up.	Maintain/improve public roads, bridges, other transportation features;Build/improve flood protection;	Plan to do in the future	Done this	Done this			Plan to do in the future	Done this
102	Main access roads, local medical clinic, local nursing home, emergency services facilities, daycares	Yes	Major flooding	Alert/warning system;Shelters: Emergency or Storm shelters;Maintain/improve public roads, bridges, other transportation features;More emergency services;Public education and outreach;	Done this	Done this	Done this	Won't do this	Done this	Done this	Won't do this
103	bridges, low-lying areas, refinery, trailer parks	Yes		Alert/warning system;Shelters: Emergency or Storm shelters;Build/improve flood protection;More emergency services;	Thinking about doing this	Plan to do in the future	Plan to do in the future	Can't do this	Thinking about doing this	Thinking about doing this	Plan to do in the future
104		Yes	My home was struck by lightning approximately 10 years ago in July. This caused a fire to my home and I was displaced for 10 months because they had to rebuild a condo that I lived in.	Shelters: Emergency or Storm shelters;Keep or expand open spaces & natural areas;Maintain/improve public roads, bridges, other transportation features;Protect natural resources;Public education and outreach;	Thinking about doing this	Thinking about doing this	Done this	Won't do this	Won't do this	Thinking about doing this	Won't do this
105	None	No		Alert/warning system;Shelters: Emergency or Storm shelters;Build/improve flood protection;Keep or expand open spaces & natural areas;	Can't do this	Thinking about doing this	Done this	Plan to do in the future	Done this	Done this	Plan to do in the future
106	Interstates closing during winter storms is major because we do not have access to essentials out here.	Yes	Severe winter storms have kept us stuck at or in our homes without any access to anything. The winter of 2023 was a struggle to keep ourselves and all of our animals fed and neighbors were making wind blocks with the massive amounts of snow that we had.	Alert/warning system;Shelters: Emergency or Storm shelters;Build/improve flood protection;Maintain/improve public roads, bridges, other transportation features;Public education and outreach;	Done this	Plan to do in the future	Plan to do in the future	Done this	Plan to do in the future	Plan to do in the future	Done this
107	electric and gas outages, and the ability to get around	Yes	have been through numerous storms and flooding, causing loss of property, damaged property	Alert/warning system;Shelters: Emergency or Storm shelters;Maintain/improve public roads, bridges, other transportation features;More emergency services;	Done this	Done this	Done this	Done this	Done this	Can't do this	Done this
108	Refinery	Yes	Gas line ruptured in Mandan	Public education and outreach;More emergency services;							
109		Yes		Alert/warning system;Keep or expand open spaces & natural areas;Protect natural resources;Shelters: Emergency or Storm shelters;Public education and outreach;	Done this	Plan to do in the future	Plan to do in the future	Can't do this	Can't do this		Done this
110	The elderly and those who live alone	Yes	Tornadoes over the years in Dickinson and Killdeer, and hurricanes on the Gulf Coast. Most impact was recognizing how communities need to work together, along with first responders. Looky-Lews should be ticketed and fined at the very least.			Done this	Done this		Done this	Done this	
111	There's a large population that do not have a safe place to go in severe weather. The ones in town require someone to physically open them. This doesn't always occur in a timely fashion. Luckily we haven't had a real need but there have been threats and the delay in opening could be costly in the event of an actual emergency	Yes	Multiple floods	Shelters: Emergency or Storm shelters;Protect natural resources;Maintain/improve public roads, bridges, other transportation features;More emergency services;Keep or expand open spaces & natural areas;Improve water quality;	Thinking about doing this	Done this	Done this	Can't do this	Thinking about doing this	Thinking about doing this	Can't do this
112	RIVERS AND BRIDGES, WATER SYSTEM	Yes	1997 FLOOD	Maintain/improve public roads, bridges, other transportation features;Keep or expand open spaces & natural areas;Build/improve flood protection;Shelters: Emergency or Storm shelters;	Done this	Plan to do in the future	Plan to do in the future	Won't do this	Done this	Thinking about doing this	Won't do this
113	The elderly care centers here, any and all emergency response buildings	Yes	Went through hurricane hugo	Alert/warning system;Shelters: Emergency or Storm shelters;Debris/tree removal;Protect natural resources;More emergency services;Public education and outreach;	Plan to do in the future	Done this	Done this	Thinking about doing this	Thinking about doing this	Thinking about doing this	Thinking about doing this

ID	When severe weather or other dangerous events happen, are there areas of your community you worry about? (Examples may include: certain access roads, intersections, bridges, levees or other infra...	Have you or anyone in your household experienced any disasters or severe storm events? (Data will remain anonymous and only used for planning purposes.)	If yes, please share your story with us. You can describe the disaster or severe event you experienced and include details such as the type of event, when it happened, where you saw damage, and ho...	What steps should the government take to reduce risks in your area? (Check all that apply.)	Attend information meetings on natural disasters	Make a household emergency plan	Prepare a home supply kit, "go bag" or store supplies	Create a buffer around your home to protect against wildfire	Purchase hazard insurance (flood, earthquake, etc.)	Make a disaster plan with your neighbors (phone tree, home checks, etc.)	Protect and strengthen your home or business structurally (i.e., elevate it to keep it dry during a flood)
114		Yes	Flood due to dam failure flooded basement several years ago. My mom asked my dad if this was the end times, and he told her, no, that's fire.	Alert/warning system;Debris/tree removal;Keep or expand open spaces & natural areas;Maintain/improve public roads, bridges, other transportation features;Protect natural resources;Public education and outreach;Improve water quality;	Won't do this	Done this	Plan to do in the future	Can't do this	Can't do this	Won't do this	Can't do this
115	Yes	No		Maintain/improve public roads, bridges, other transportation features;Alert/warning system;Debris/tree removal;	Thinking about doing this	Thinking about doing this	Thinking about doing this	Can't do this	Won't do this	Won't do this	Thinking about doing this
116	Main road through town being unusable, fire station receiving damage. Elderly community memebers being unaware of the storm.	Yes	Wind and hail storm causing trees to block roads making it unable for many to leave home. Causing Community members not having access to supplies including medications. Many not being able to get to work and having to take vacation. Loss of power and over half the community doesn't have an alternate source of energy to hear storm updates, have heat or make meals. Last year's severe winter storms causing the same issues.	Alert/warning system;Debris/tree removal;Maintain/improve public roads, bridges, other transportation features;Shelters: Emergency or Storm shelters;	Can't do this	Done this	Done this	Can't do this	Done this	Plan to do in the future	Can't do this
117	Young children and the elderly are less mobile in the event of a disaster. Low-lying areas that flood.	No	Not in this state	Shelters: Emergency or Storm shelters;Build/improve flood protection;Maintain/improve public roads, bridges, other transportation features;Public education and outreach;More emergency services;	Plan to do in the future	Done this	Done this	Can't do this	Can't do this	Won't do this	Won't do this
118	The rural community having access to the town for services, the ability to travel to a town with a larger hospital	Yes		Maintain/improve public roads, bridges, other transportation features;More emergency services;Public education and outreach;	Done this	Done this	Done this	Done this	Thinking about doing this	Thinking about doing this	Done this
119	Williston does not open up safe facilities for people in trailers/rvs in case of tornados. This town could care less about their citizens	No		Shelters: Emergency or Storm shelters;Maintain/improve public roads, bridges, other transportation features;More emergency services;	Plan to do in the future	Done this	Done this	Done this	Done this	Thinking about doing this	Can't do this
120	No	Yes	Yes when the big wind storm hit new Rockford a couple of years ago aNDDEStroyed a lot of property in town including our local municipal airport hanger which ended up on the highway	Alert/warning system;Shelters: Emergency or Storm shelters;More emergency services;	Thinking about doing this	Plan to do in the future	Plan to do in the future	Thinking about doing this	Can't do this	Thinking about doing this	Thinking about doing this
121		Yes	Tornado,severe hail, flooding	Build/improve flood protection;	Done this	Done this	Done this				Done this
122	Access to main road from our neighborhood.	Yes	Blizzards closing Interstate and being asked to stay home/off roads in Fargo. We are very close to a snow emergency route. It usually only takes 36 hours after end of storm to get plowed out. Shoveling pile at end of driveway is sometimes very difficult for a senior citizen.	Alert/warning system;Shelters: Emergency or Storm shelters;Build/improve flood protection;	Thinking about doing this	Done this	Done this	Won't do this	Done this	Thinking about doing this	Can't do this
123	Most worried about people in an apartment building during tornadoes. We need more public storm shelters. As someone who lives close to the river, I'm also worried about another historic flood.	No		Shelters: Emergency or Storm shelters;Build/improve flood protection;Alert/warning system;	Done this	Done this	Thinking about doing this	Can't do this	Can't do this	Thinking about doing this	Can't do this
124	Roadways, Access to facilities	Yes	We were snowed in for three days	Alert/warning system;Shelters: Emergency or Storm shelters;Maintain/improve public roads, bridges, other transportation features;More emergency services;Public education and outreach;	Done this	Plan to do in the future	Plan to do in the future	Can't do this	Won't do this	Plan to do in the future	Done this
125	Roads, infrastructure, houses,etc	Yes	Flooded the basement and ruined everything in it! Hard to clean up and keep mold out of house.	Debris/tree removal;Build/improve flood protection;Maintain/improve public roads, bridges, other transportation features;	Done this	Done this	Thinking about doing this	Thinking about doing this	Thinking about doing this	Plan to do in the future	Plan to do in the future
126	No	No	NA	Shelters: Emergency or Storm shelters;	Won't do this	Thinking about doing this	Plan to do in the future	Won't do this	Won't do this	Won't do this	Won't do this
127	Preparation of area farmers and ranchers.	Yes	Drought has been a significant impact in this area making it hard to continue in an operation.	Protect natural resources;Public education and outreach;Alert/warning system;Improve water quality;	Done this	Done this	Plan to do in the future	Thinking about doing this	Can't do this	Thinking about doing this	Can't do this
128	No	No		Alert/warning system;Shelters: Emergency or Storm shelters;	Won't do this	Won't do this	Won't do this	Won't do this	Won't do this	Won't do this	Won't do this
129	My young children	No		Alert/warning system;Shelters: Emergency or Storm shelters;Debris/tree removal;Build/improve flood protection;Improve water quality;Maintain/improve public roads, bridges, other transportation features;Protect natural resources;More emergency services;Public education and outreach;		Thinking about doing this	Thinking about doing this				Thinking about doing this
130	My children driving in winter storm and hazardous roads	Yes	Driving in severe winter weather	Alert/warning system;Maintain/improve public roads, bridges, other transportation features;	Won't do this	Thinking about doing this	Thinking about doing this	Won't do this	Won't do this	Thinking about doing this	Won't do this
131		No		Alert/warning system;Shelters: Emergency or Storm shelters;Build/improve flood protection;Maintain/improve public roads, bridges, other transportation features;	Thinking about doing this	Thinking about doing this	Thinking about doing this	Won't do this	Won't do this	Won't do this	Won't do this
132		Yes			Done this	Done this	Done this		Done this		
133	Road access can be compromised very easily here. Electricity and cellphone service is/can be very unreliable.	Yes	My family was snow bound on our farm for more than a week a couple of times the last couple of years. Big part of the reason is due to lack of snowplow service to the roads. Cellphone service was in and out, the same with electricity.	Maintain/improve public roads, bridges, other transportation features;More emergency services;Stabilize the Electrical/cellphone systems;	Done this	Done this	Done this	Can't do this	Can't do this	Done this	Done this
134	mobile home parks in any disaster have nowhere to go. No one listens to public health because they are too busy making it political and not making it about their health.	Yes		Shelters: Emergency or Storm shelters;Debris/tree removal;Public education and outreach;Protect natural resources;	Done this	Done this	Done this	Plan to do in the future	Done this	Thinking about doing this	Thinking about doing this
135	critical infrastructure, access to medical care, safe drinking water, power failures	No		Alert/warning system;Shelters: Emergency or Storm shelters;Debris/tree removal;Build/improve flood protection;Keep or expand open spaces & natural areas;Improve water quality;Maintain/improve public roads, bridges, other transportation features;Protect natural resources;More emergency services;Public education and outreach;Disease prevention ;	Thinking about doing this	Thinking about doing this	Thinking about doing this	Can't do this	Won't do this	Thinking about doing this	Can't do this
136	Underpass downtown, elderly	Yes	Farm outside of McClusky. We saw a dark tornado coming towards our farm. When it hit it took out a tree bigger than 3 people could circle and saved it upside down in front of picture window and then our brand new quanset flatten like a pancake.	Maintain/improve public roads, bridges, other transportation features;Alert/warning system;	Done this	Done this	Done this	Won't do this	Won't do this	Thinking about doing this	Won't do this
137	No	Yes		Alert/warning system;Debris/tree removal;Shelters: Emergency or Storm shelters;Build/improve flood protection;Keep or expand open spaces & natural areas;Improve water quality;Maintain/improve public roads, bridges, other transportation features;Protect natural resources;More emergency services;Public education and outreach;	Done this	Done this	Done this	Won't do this	Won't do this	Won't do this	Won't do this
138		No	Never	Alert/warning system;Improve water quality;Maintain/improve public roads, bridges, other transportation features;Public education and outreach;More emergency services;		Done this	Done this	Done this			
139	Lowland	Yes	Wildfire 2016 when we lived in Ft Mc Murray Alberta canada, came close to losing everything	Keep or expand open spaces & natural areas;Maintain/improve public roads, bridges, other transportation features;Protect natural resources;	Won't do this	Done this	Done this	Done this	Won't do this	Won't do this	Won't do this
140	Any critical infrastructure	Yes	1997 flood in Grand Forks was most significant. The level of destruction was unfathomable. The resiliency of the people was inspiring	More emergency services;Maintain/improve public roads, bridges, other transportation features;Alert/warning system;	Done this	Plan to do in the future	Plan to do in the future	Plan to do in the future	Done this	Plan to do in the future	Can't do this

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141	Township roadways	No		Alert/warning system;Shelters: Emergency or Storm shelters;Maintain/improve public roads, bridges, other transportation features;	Done this	Done this	Done this	Done this	Done this	Done this	Done this
142	All of the gravel roads that are poorly maintained due to the oilfield. Snow removal is a major Hassel and after any amount of rain almost every road becomes a sloppy mess.	Yes	I've grown up studying Emergency Management and researching the 1996-1997 blizzards and floods in the Grand Forks area along with the 2011 Minot flood. Every blizzard that happened in 2021-2022 shut parts of stanley down. Alot of farms out side of town went with out power and water due to lack of power for nearly a week. With any rain we get any gravel roads become a Hazzard and if oilfield truck drivers are not prepared it's only a matter of time before there is a roll over or accident that causes a chemical spill or explosion.	Shelters: Emergency or Storm shelters;Debris/tree removal;Keep or expand open spaces & natural areas;Maintain/improve public roads, bridges, other transportation features;More emergency services;Public education and outreach;	Done this	Done this	Done this	Thinking about doing this	Thinking about doing this	Plan to do in the future	Thinking about doing this
143		No		Shelters: Emergency or Storm shelters;Keep or expand open spaces & natural areas;Maintain/improve public roads, bridges, other transportation features;More emergency services;	Done this	Plan to do in the future	Plan to do in the future	Done this	Done this	Thinking about doing this	Plan to do in the future
144		Yes	Flooding 1997, 2001, 2009, 2010 I was in communities in North Dakota and experience property loss/damage from floods and dikes breaking.	Keep or expand open spaces & natural areas;Maintain/improve public roads, bridges, other transportation features;Public education and outreach;	Won't do this	Done this	Plan to do in the future	Won't do this	Can't do this	Thinking about doing this	Done this
145		No		Debris/tree removal;Keep or expand open spaces & natural areas;Maintain/improve public roads, bridges, other transportation features;Protect natural resources;Public education and outreach;	Won't do this	Won't do this	Can't do this	Can't do this	Can't do this	Can't do this	Can't do this
146		No		Alert/warning system;Shelters: Emergency or Storm shelters;Build/improve flood protection;Improve water quality;Maintain/improve public roads, bridges, other transportation features;Protect natural resources;Public education and outreach;	Thinking about doing this	Done this	Thinking about doing this	Thinking about doing this	Thinking about doing this	Thinking about doing this	Can't do this
147		No		Debris/tree removal;Maintain/improve public roads, bridges, other transportation features;Public education and outreach;Keep or expand open spaces & natural areas;	Thinking about doing this	Thinking about doing this	Thinking about doing this	Thinking about doing this	Thinking about doing this	Thinking about doing this	Thinking about doing this
148	NA	No		Alert/warning system;Shelters: Emergency or Storm shelters;Debris/tree removal;Maintain/improve public roads, bridges, other transportation features;More emergency services;Public education and outreach;	Plan to do in the future	Done this	Plan to do in the future	Won't do this	Done this	Plan to do in the future	Can't do this
149	The city of Berthold has never been concerned about its citizens when the power was out during frig temperatures or blizzard conditions. They took absolutely no Covid precautions. How could a citizen feel safe when the city council is so apathetic?	Yes	I drove in and helped almost everyday to the Flood Victim Animal Shelter in 2011.	Alert/warning system;Shelters: Emergency or Storm shelters;Debris/tree removal;Build/improve flood protection;Keep or expand open spaces & natural areas;Improve water quality;Maintain/improve public roads, bridges, other transportation features;Protect natural resources;More emergency services;Public education and outreach;Accountability for cities who allow oil companies to dump chemical and oil on the land and in waterways ;	Done this	Done this	Done this	Thinking about doing this	Done this	Done this	Done this
150	School	No		Alert/warning system;Improve water quality;Maintain/improve public roads, bridges, other transportation features;More emergency services;	Thinking about doing this	Thinking about doing this	Thinking about doing this	Won't do this	Won't do this	Won't do this	Won't do this
151	Staffing for hospital	Yes	Went through flood when I lived in Fargo. Went through Hurricane Andrew when I lived in S Florida.	Maintain/improve public roads, bridges, other transportation features;Debris/tree removal;Shelters: Emergency or Storm shelters;		Done this	Plan to do in the future	Thinking about doing this	Thinking about doing this		Thinking about doing this
152	Young children and elderly	Yes	Severe snow storms of being trapped into house for days on end and having damage to roof Major flooding	Build/improve flood protection;	Thinking about doing this	Done this	Done this	Thinking about doing this	Plan to do in the future	Plan to do in the future	Can't do this
153	No	Yes	Two of my children and I were in Mott when the tornado passed through 4 years ago. It passed quite near my parents' house though we didn't know it at the time. We were able to stay safe in the basement, and luckily there was little damage from the high wind and hail (our van was completely unscathed despite being parked in the street). My oldest has had an intense fear of high wind and thunderstorms ever since.	Alert/warning system;Debris/tree removal;Maintain/improve public roads, bridges, other transportation features;	Thinking about doing this	Plan to do in the future	Plan to do in the future	Can't do this	Can't do this	Thinking about doing this	Can't do this
154	Railway crossing on Route 66 causing emergency response to be delayed due to trains	No		Maintain/improve public roads, bridges, other transportation features;Public education and outreach;Build/improve flood protection;	Thinking about doing this	Plan to do in the future	Done this	Can't do this	Done this	Plan to do in the future	Can't do this
155	Bridges and roads. Hospitals and nursing homes.	Yes	1997 flood/ fire in Grand Forks. 2009 flood in Fargo.	Debris/tree removal;Keep or expand open spaces & natural areas;Improve water quality;Maintain/improve public roads, bridges, other transportation features;Protect natural resources;More emergency services;Public education and outreach;	Done this	Plan to do in the future	Thinking about doing this	Won't do this	Won't do this	Can't do this	Done this
156		No		Alert/warning system;Keep or expand open spaces & natural areas;Maintain/improve public roads, bridges, other transportation features;Protect natural resources;Public education and outreach;	Thinking about doing this	Plan to do in the future	Plan to do in the future	Won't do this	Done this	Thinking about doing this	Thinking about doing this
157	Yes, winter has been shutting down our roads and making it hard to travel- in Bismarck	No		Maintain/improve public roads, bridges, other transportation features;Public education and outreach;Clear winter roads within one day- or at least make them more drivable;			Can't do this				
158	Any of the towns	Yes	Tornado damage	Shelters: Emergency or Storm shelters;More emergency services;	Done this	Done this	Done this				
159	Homes flooding along the river and bridges washing out. Also worry about the folks at 4th corp and lutheran home of the good shepherd	Yes	The microburst windstorm a few years ago. Caused a lot of damage in the area	Debris/tree removal;Improve water quality;Maintain/improve public roads, bridges, other transportation features;More emergency services;Build/improve flood protection;	Thinking about doing this	Plan to do in the future	Plan to do in the future	Thinking about doing this	Plan to do in the future	Thinking about doing this	Plan to do in the future
160		No		Improve water quality;Keep or expand open spaces & natural areas;Debris/tree removal;Shelters: Emergency or Storm shelters;	Plan to do in the future	Plan to do in the future	Plan to do in the future	Plan to do in the future	Done this	Plan to do in the future	Plan to do in the future
161		No		Shelters: Emergency or Storm shelters;Public education and outreach;	Done this	Plan to do in the future	Plan to do in the future	Plan to do in the future	Won't do this	Can't do this	Can't do this
162	The elderly	Yes	The county road I utilized had the culvert wash out repeatedly over the years. Also having more than one deluge of rain has flooded my basement.	Maintain/improve public roads, bridges, other transportation features;	Done this	Done this	Done this	Won't do this	Can't do this	Can't do this	Can't do this
163	being able to get to work or not having childcare when school is cancelled; also access to basic supplies if I can't get around	No		Alert/warning system;Debris/tree removal;More emergency services;Public education and outreach;	Thinking about doing this	Done this	Plan to do in the future	Can't do this	Can't do this	Plan to do in the future	Plan to do in the future
164	Hospital	Yes	Hail wind storm	Public education and outreach;	Done this	Done this	Plan to do in the future	Can't do this	Won't do this	Won't do this	Won't do this
165	No specific area	No		Alert/warning system;Debris/tree removal;More emergency services;	Plan to do in the future	Done this	Done this	Won't do this	Won't do this	Plan to do in the future	Done this

ID	When severe weather or other dangerous events happen, are there areas of your community you worry about? (Examples may include: certain access roads, intersections, bridges, levees or other infra...	Have you or anyone in your household experienced any disasters or severe storm events? (Data will remain anonymous and only used for planning purposes.)	If yes, please share your story with us. You can describe the disaster or severe event you experienced and include details such as the type of event, when it happened, where you saw damage, and ho...	What steps should the government take to reduce risks in your area? (Check all that apply.)	Attend information meetings on natural disasters	Make a household emergency plan	Prepare a home supply kit, "go bag" or store supplies	Create a buffer around your home to protect against wildfire	Purchase hazard insurance (flood, earthquake, etc.)	Make a disaster plan with your neighbors (phone tree, home checks, etc.)	Protect and strengthen your home or business structurally (i.e., elevate it to keep it dry during a flood)
166	school, nursing home, hospital, elderly that live on their own, roads and bridges throughout the county	Yes	High wind/tornado event - downed trees that had to be cut up and removed, which took time and equipment; roof damage to our home which had to be fixed, requiring time, materials, and need for additional help from others; damage to siding on home which needed replacement so materials and labor were required. Spring flooding event (possibly in 2009 but unsure of exact year) - bridge washed out on rural 11th St NE, county paved road under water, gravel roads washed out and/or under water - this all caused need for finding another route to get to town and due to road problems in every direction there was only one way to get to town (which required additional miles and time as it was not a direct route) and that road was also half under water.	Alert/warning system;Shelters: Emergency or Storm shelters;Debris/tree removal;Maintain/improve public roads, bridges, other transportation features;Public education and outreach;Keep or expand open spaces & natural areas;More emergency services;	Thinking about doing this	Plan to do in the future	Done this	Can't do this	Can't do this	Thinking about doing this	Can't do this
167	underpasses, homeless, major intersections	Yes		Debris/tree removal;Keep or expand open spaces & natural areas;Maintain/improve public roads, bridges, other transportation features;Protect natural resources;	Can't do this	Thinking about doing this	Thinking about doing this	Won't do this	Won't do this	Won't do this	Won't do this
168	If the damn at sakakawea is targeted then we, downstream, are SOL.	Yes	Annual hail and win storm events.	Protect natural resources;Add more trees to slow the wind.;	Thinking about doing this	Done this	Plan to do in the future	Won't do this	Won't do this	Won't do this	Done this
169		Yes	Tornado back in my home state over 10 years ago. Several houses severely damaged, power was out for multiple days in the whole area, interstate ramps were closed near the town restricting traffic. National guard was helping out. I take tornado warnings more serious than the majority of my friends/family here in north dakota.	Debris/tree removal;Alert/warning system;Maintain/improve public roads, bridges, other transportation features;Protect natural resources;More emergency services;	Done this	Plan to do in the future	Thinking about doing this	Can't do this	Done this	Can't do this	Can't do this
170		No		Alert/warning system;Shelters: Emergency or Storm shelters;Build/improve flood protection;Keep or expand open spaces & natural areas;Protect natural resources;More emergency services;	Done this	Plan to do in the future	Plan to do in the future	Thinking about doing this	Thinking about doing this	Thinking about doing this	Can't do this
171	The school would be the largest density in a disaster.	Yes	As a firefighter and paramedic I have seen and responded to many accidents, fires, tornadoes and chemical spills. They are a huge challenge in any community, but especially in very rural areas.	Alert/warning system;Shelters: Emergency or Storm shelters;Maintain/improve public roads, bridges, other transportation features;More emergency services;Public education and outreach;	Done this	Done this	Done this	Can't do this	Can't do this	Thinking about doing this	Can't do this
172	Access to medical care.	No		Maintain/improve public roads, bridges, other transportation features;Build/improve flood protection;	Done this	Done this	Done this	Won't do this	Won't do this	Done this	Won't do this
173	Hospitals, children getting stuck at school, EMS			More emergency services;Protect natural resources;	Done this	Thinking about doing this	Thinking about doing this	Won't do this	Won't do this	Won't do this	Thinking about doing this
174	townships don't have enough funding available to take care of roads. at times only one road is passable in winter	Yes	townships don't have enough funding available to take care of roads. at times only one road is passable in winter	Alert/warning system;Maintain/improve public roads, bridges, other transportation features;more funding for roads;	Done this	Done this	Done this	Done this	Won't do this	Done this	Done this
175	The areas located near the railroad tracks through town and the impact to nearby areas.	Yes	Train Derailment near Minot that released Anhydrous in 2002. The event raised alarms for further events occurring due to the proximity of most Minot residents to the tracks. 2011 Minot Flood. This disaster left many people without places to stay and much of the city's infrastructure was damaged.	Improve water quality;Maintain/improve public roads, bridges, other transportation features;Public education and outreach;Keep or expand open spaces & natural areas;Shelters: Emergency or Storm shelters;	Done this	Plan to do in the future	Plan to do in the future	Can't do this	Done this	Thinking about doing this	Done this
176	Access roads (underpass), Hospital/clinics, fire and ambulance building	No		Alert/warning system;Shelters: Emergency or Storm shelters;Debris/tree removal;Protect natural resources;More emergency services;Public education and outreach;	Done this	Done this	Plan to do in the future	Can't do this	Done this	Done this	Done this
177	No	No		Alert/warning system;Debris/tree removal;Maintain/improve public roads, bridges, other transportation features;	Thinking about doing this	Plan to do in the future	Thinking about doing this	Won't do this	Can't do this	Plan to do in the future	Plan to do in the future
178		Yes	Major flooding in 1993? Roads washed out, our rural water access line into our farm caved, collapsed. Christmas storm of 2015? 2016? Caused roof to collapse on our machine storage shed.	Shelters: Emergency or Storm shelters;Maintain/improve public roads, bridges, other transportation features;	Done this	Thinking about doing this	Thinking about doing this	Thinking about doing this	Can't do this	Thinking about doing this	Thinking about doing this
179		Yes	My home was situated in the 2011 flood and we could not reside in the home for 5 months.	Alert/warning system;Shelters: Emergency or Storm shelters;Debris/tree removal;Build/improve flood protection;Keep or expand open spaces & natural areas;Improve water quality;Maintain/improve public roads, bridges, other transportation features;Protect natural resources;More emergency services;Public education and outreach;	Done this	Done this	Done this	Done this	Done this	Done this	Done this
180		Yes		Maintain/improve public roads, bridges, other transportation features;More emergency services;Public education and outreach;	Done this	Done this	Done this	Done this	Done this	Done this	Done this
181	nursing homes, hospitals, fire stations, and any other medical entities	No		Shelters: Emergency or Storm shelters;Alert/warning system;Maintain/improve public roads, bridges, other transportation features;More emergency services;emergency routes expanded to nursing homes;	Plan to do in the future	Plan to do in the future	Plan to do in the future	Won't do this	Done this	Plan to do in the future	Plan to do in the future
182	Bridges between Bismarck and Mandan.	No		Maintain/improve public roads, bridges, other transportation features;Debris/tree removal;Alert/warning system;	Won't do this	Done this	Plan to do in the future	Can't do this	Done this	Thinking about doing this	Can't do this
183		Yes	2010 flood in South Bismarck, I just helped relatives sandbag	Alert/warning system;Maintain/improve public roads, bridges, other transportation features;Build/improve flood protection;	Plan to do in the future	Done this	Done this	Plan to do in the future	Done this	Plan to do in the future	Plan to do in the future
184	Sakakawea Medical Center, Knife River Care Center, Hazen and Beulah Riverside Parks, South Beulah (Flood Zone), Senior Suites	Yes	Severe windstorm this summer at Hazen/Beulah Bay and surrounding area caused extensive property damage to people I know personally. Tornado going past Hazen Hospital 2019 Cyber Bomb threat to SMC and surrounding clinics in 2015 Tornado touch down at campground when I was about 8 years old.	Alert/warning system;Public education and outreach;Maintain/improve public roads, bridges, other transportation features;	Done this	Plan to do in the future	Done this	Can't do this	Can't do this	Done this	Can't do this
185		Yes	In 1997 my in laws were without power for 2 weeks following blizzard Hannah. I lived in Grand Forks during the 1997 flood and was displaced.	Alert/warning system;Maintain/improve public roads, bridges, other transportation features;More emergency services;Public education and outreach;	Won't do this	Thinking about doing this	Won't do this	Done this	Done this	Won't do this	Done this
186	My road to the highway (6th St SE on the Wells-Stutsman county line) has some low spots that are problematic in wet weather and during snow events.	Yes	Roads have been underwater numerous times in the past 10 years or so. Snow drifts have impacted travel some winters as well.		Won't do this	Thinking about doing this	Done this	Plan to do in the future	Can't do this	Done this	Done this
187	I worry about damage to our hospital and loss of firefighter response.	No		Alert/warning system;Shelters: Emergency or Storm shelters;Public education and outreach;	Thinking about doing this	Plan to do in the future	Thinking about doing this	Thinking about doing this	Thinking about doing this	Thinking about doing this	Thinking about doing this
188	Access to groceries, loss of heat/air for elderly, access to medical necessities	No		Maintain/improve public roads, bridges, other transportation features;Shelters: Emergency or Storm shelters;Keep or expand open spaces & natural areas;		Thinking about doing this	Thinking about doing this			Thinking about doing this	
189		No		Alert/warning system;	Thinking about doing this	Done this	Thinking about doing this	Thinking about doing this	Plan to do in the future	Thinking about doing this	Plan to do in the future
190	Bridge underpass on Villard st, also State Ave	No		Alert/warning system;Shelters: Emergency or Storm shelters;Build/improve flood protection;Maintain/improve public roads, bridges, other transportation features;Protect natural resources;More emergency services;Public education and outreach;	Won't do this	Plan to do in the future	Done this	Won't do this	Won't do this	Won't do this	Thinking about doing this

ID	When severe weather or other dangerous events happen, are there areas of your community you worry about? (Examples may include: certain access roads, intersections, bridges, levees or other infra...	Have you or anyone in your household experienced any disasters or severe storm events? (Data will remain anonymous and only used for planning purposes.)	If yes, please share your story with us. You can describe the disaster or severe event you experienced and include details such as the type of event, when it happened, where you saw damage, and ho...	What steps should the government take to reduce risks in your area? (Check all that apply.)	Attend information meetings on natural disasters	Make a household emergency plan	Prepare a home supply kit, "go bag" or store supplies	Create a buffer around your home to protect against wildfire	Purchase hazard insurance (flood, earthquake, etc.)	Make a disaster plan with your neighbors (phone tree, home checks, etc.)	Protect and strengthen your home or business structurally (i.e., elevate it to keep it dry during a flood)
191	All of your examples. All of them. (certain access roads, intersections, bridges, levees or other infrastructure; important buildings like hospitals, fire stations, or community centers; or specific populations like young children or the elderly)	Yes	Flood event where communites were displaced.	Alert/warning system;Shelters: Emergency or Storm shelters;Maintain/improve public roads, bridges, other transportation features;Public education and outreach;	Done this	Thinking about doing this	Thinking about doing this	Won't do this	Won't do this	Thinking about doing this	Won't do this
192	Young Children	Yes	Several tornados in ND and Texas	Alert/warning system;Shelters: Emergency or Storm shelters;Build/improve flood protection;Maintain/improve public roads, bridges, other transportation features;More emergency services;Public education and outreach;	Done this	Plan to do in the future	Done this	Thinking about doing this	Done this	Plan to do in the future	Thinking about doing this
193	Mobile home parks	Yes	Working @ FD when tornado/severe storms hit Bismarck area saw people hurt and buildings damaged	Shelters: Emergency or Storm shelters;Alert/warning system;Public education and outreach;More emergency services;Build/improve flood protection;	Done this	Done this	Plan to do in the future	Plan to do in the future	Plan to do in the future	Thinking about doing this	Can't do this
194		No		Alert/warning system;Shelters: Emergency or Storm shelters;Debris/tree removal;Build/improve flood protection;Improve water quality;Keep or expand open spaces & natural areas;Maintain/improve public roads, bridges, other transportation features;Protect natural resources;More emergency services;Public education and outreach;	Thinking about doing this	Thinking about doing this	Thinking about doing this	Won't do this	Thinking about doing this	Thinking about doing this	Thinking about doing this
195	Access: emergency exit roads emergency buildings no s and family	Yes		Alert/warning system;Shelters: Emergency or Storm shelters;Debris/tree removal;Build/improve flood protection;Keep or expand open spaces & natural areas;Maintain/improve public roads, bridges, other transportation features;Protect natural resources;More emergency services;Expand our emergency services- how does the fire department in Bismarck not have a water rescue team?!?!?! ;	Done this	Plan to do in the future	Done this	Thinking about doing this	Plan to do in the future	Plan to do in the future	Plan to do in the future
196	Truth from media and our officials	No		Alert/warning system;Shelters: Emergency or Storm shelters;Debris/tree removal;Improve water quality;Public education and outreach;	Won't do this	Thinking about doing this	Thinking about doing this	Won't do this	Won't do this	Won't do this	Won't do this
197	South Bismarck and along the river	Yes		Alert/warning system;Shelters: Emergency or Storm shelters;Build/improve flood protection;	Plan to do in the future	Done this	Done this	Done this		Plan to do in the future	
198	Nope	No		Alert/warning system;Shelters: Emergency or Storm shelters;	Thinking about doing this	Thinking about doing this	Thinking about doing this	Thinking about doing this	Thinking about doing this	Thinking about doing this	Thinking about doing this
199	Infrastructure, my home, my car	No	NA	Alert/warning system;Shelters: Emergency or Storm shelters;Debris/tree removal;Build/improve flood protection;Improve water quality;Keep or expand open spaces & natural areas;Protect natural resources;	Thinking about doing this	Plan to do in the future	Done this	Plan to do in the future	Plan to do in the future	Thinking about doing this	Plan to do in the future
200		Yes	Wilma Hurricane	None they are useless ;	Plan to do in the future	Plan to do in the future	Plan to do in the future	Done this	Plan to do in the future	Plan to do in the future	Done this
201	Roads and bridges.	No		Alert/warning system;Maintain/improve public roads, bridges, other transportation features;More emergency services;	Plan to do in the future	Thinking about doing this	Done this	Thinking about doing this	Done this	Thinking about doing this	Done this
202		No		Alert/warning system;Shelters: Emergency or Storm shelters;Keep or expand open spaces & natural areas;Improve water quality;Maintain/improve public roads, bridges, other transportation features;More emergency services;Public education and outreach;Protect natural resources;	Plan to do in the future	Plan to do in the future	Done this	Thinking about doing this	Won't do this	Plan to do in the future	Won't do this
203	Bridges, specifically the underpasses	No		Alert/warning system;Debris/tree removal;Maintain/improve public roads, bridges, other transportation features;Public education and outreach;	Can't do this	Plan to do in the future	Done this	Won't do this	Can't do this	Thinking about doing this	Can't do this
204	Not having an emergency shelter we can go to. Not having Morton County Code Red sending notifications anymore.	Yes	and they have all affected us differently. Every situation is different so it's hard to pick just one. Here are my concerns: During any severe or tornado weather we don't have a safe place to shelter besides our home. I wish we had a shelter to go to. I've seen huge trees blow over and block streets. I've seen the city crews struggle with clearing drifts of snow (with primitive equipment) larger than houses just to clear the emergency routes for the ambulance. The city's emergency siren is ancient and is manually operated. What if those who can run it aren't in town at the time to set it off? We would have no warning at all. Streets...don't even get me started on streets. Enough said. Small communities need HELP! Actual help. Money help! Not information or outreach!!! State agencies can preach Mitigation strategies to anyone who will listen but that isn't the help we need or want. There seem to be plenty of funding opportunities to talk about something but never any funding to fix anything. It is very frustrating, as a resident, to know our council is trying but they keep hitting brick walls everywhere they turn. Our council want to improve, but don't have the money to do it.	Alert/warning system;Shelters: Emergency or Storm shelters;Debris/tree removal;Maintain/improve public roads, bridges, other transportation features;	Done this	Done this	Done this	Won't do this	Can't do this	Thinking about doing this	Plan to do in the future
205	My citizens who are unable to care for themselves; elderly, infirmed	No		Alert/warning system;Shelters: Emergency or Storm shelters;More emergency services;	Done this	Done this	Plan to do in the future	Won't do this	Done this	Plan to do in the future	Done this
206	I worry about all the people in the community not having access to a shelter. I worry about if something happens to the school we would have no where for people to safely go in a disaster. I worry that we don't have a community emergency plan or volunteers to assist elderly or families with small children to get to safety.	Yes	A number of years ago my house got hit with what I believe was a straight wind. I'm not really sure. Just sounded like a large boom against my house. Luckily the only major damage was our huge wood playset was blown about 10 ft aNDDEStroyed and the trampoline flew over the neighbors house and was destroyed.	Alert/warning system;Shelters: Emergency or Storm shelters;Maintain/improve public roads, bridges, other transportation features;Public education and outreach;More emergency services;	Thinking about doing this	Done this	Plan to do in the future	Thinking about doing this	Thinking about doing this	Thinking about doing this	Plan to do in the future
207	Interstate access and state street acerss	No		Alert/warning system;Public education and outreach;Protect natural resources;	Thinking about doing this	Plan to do in the future	Done this	Thinking about doing this	Thinking about doing this	Plan to do in the future	Thinking about doing this
208		No		Public education and outreach;	Won't do this	Done this	Plan to do in the future	Won't do this	Done this	Can't do this	Won't do this
209	None	No		Alert/warning system;Maintain/improve public roads, bridges, other transportation features;Public education and outreach;	Thinking about doing this	Thinking about doing this	Thinking about doing this	Thinking about doing this	Thinking about doing this	Thinking about doing this	Thinking about doing this
210	Roads and a bus routes are often quite dangerous in the winter.	No		Build/improve flood protection;Improve water quality;Maintain/improve public roads, bridges, other transportation features;	Thinking about doing this	Done this	Done this	Thinking about doing this	Done this	Thinking about doing this	Done this
211		No		Public education and outreach;Maintain/improve public roads, bridges, other transportation features;	Thinking about doing this	Plan to do in the future	Done this	Can't do this	Won't do this	Done this	Can't do this
212		No		Public education and outreach;	Plan to do in the future	Plan to do in the future	Plan to do in the future	Plan to do in the future			
213		No		Alert/warning system;Shelters: Emergency or Storm shelters;Public education and outreach;	Thinking about doing this	Done this	Done this	Done this	Plan to do in the future	Plan to do in the future	Plan to do in the future
214		Yes	1997 Grand Forks flood	Alert/warning system;Maintain/improve public roads, bridges, other transportation features;Public education and outreach;	Thinking about doing this	Done this	Done this	Plan to do in the future	Plan to do in the future	Done this	Done this
215	All of the above	Yes		Shelters: Emergency or Storm shelters;Improve water quality;Maintain/improve public roads, bridges, other transportation features;Protect natural resources;More emergency services;Public education and outreach;	Plan to do in the future	Plan to do in the future	Plan to do in the future	Plan to do in the future	Plan to do in the future	Plan to do in the future	Plan to do in the future

ID	When severe weather or other dangerous events happen, are there areas of your community you worry about? (Examples may include: certain access roads, intersections, bridges, levees or other infra...	Have you or anyone in your household experienced any disasters or severe storm events? (Data will remain anonymous and only used for planning purposes.)	If yes, please share your story with us. You can describe the disaster or severe event you experienced and include details such as the type of event, when it happened, where you saw damage, and ho...	What steps should the government take to reduce risks in your area? (Check all that apply.)	Attend information meetings on natural disasters	Make a household emergency plan	Prepare a home supply kit, "go bag" or store supplies	Create a buffer around your home to protect against wildfire	Purchase hazard insurance (flood, earthquake, etc.)	Make a disaster plan with your neighbors (phone tree, home checks, etc.)	Protect and strengthen your home or business structurally (i.e., elevate it to keep it dry during a flood)
216		Yes	N/A	Alert/warning system;Shelters: Emergency or Storm shelters;Build/improve flood protection;Improve water quality;More emergency services;Public education and outreach;	Done this	Done this	Done this	Done this	Thinking about doing this	Done this	Done this
217	Everything listed.	No		Alert/warning system;Shelters: Emergency or Storm shelters;Protect natural resources;Improve water quality;Build/improve flood protection;Debris/tree removal;Maintain/improve public roads, bridges, other transportation features;	Thinking about doing this	Thinking about doing this	Thinking about doing this	Plan to do in the future	Thinking about doing this	Thinking about doing this	Done this
218		No		Shelters: Emergency or Storm shelters;Alert/warning system;Debris/tree removal;Maintain/improve public roads, bridges, other transportation features;Protect natural resources;	Won't do this	Thinking about doing this	Plan to do in the future	Can't do this	Won't do this	Won't do this	Can't do this
219	Food and water supply	No		Alert/warning system;Improve water quality;	Thinking about doing this	Done this	Done this	Won't do this	Won't do this	Won't do this	Can't do this
220	Roads being closed	Yes	Super typhoon in guam 1975	Shelters: Emergency or Storm shelters;Alert/warning system;Build/improve flood protection;Maintain/improve public roads, bridges, other transportation features;	Won't do this	Plan to do in the future	Plan to do in the future	Won't do this	Won't do this	Won't do this	Won't do this
221		Yes	A family member works for you	Maintain/improve public roads, bridges, other transportation features;	Done this	Done this	Plan to do in the future	Won't do this	Done this	Won't do this	Won't do this
222	The elderly that live in the community.	Yes	The streets not being plowed and having to walk in deep snow get needed items.	Shelters: Emergency or Storm shelters;Maintain/improve public roads, bridges, other transportation features;	Plan to do in the future	Done this	Done this	Thinking about doing this	Done this	Thinking about doing this	Thinking about doing this
223	Rural electric coop power lines	Yes	Winter storm events, causing significant power outages and transportation issues.	Alert/warning system;Shelters: Emergency or Storm shelters;Build/improve flood protection;Maintain/improve public roads, bridges, other transportation features;More emergency services;Public education and outreach;	Done this	Thinking about doing this	Done this	Done this	Done this	Won't do this	Done this
224	Underserved residents - particularly those who live in mobile homes, as well as the unhoused population; individuals with language barriers.	Yes	Flood of 1997, rural Grandin, ND - we lost everything in our basement (house was built in 1990). My mother has never been able to repair the house to it's pre-flood condition due to lack of financial resources. We were also displaced for more than a month.	Shelters: Emergency or Storm shelters;Maintain/improve public roads, bridges, other transportation features;Protect natural resources;	Thinking about doing this	Plan to do in the future	Plan to do in the future	Thinking about doing this	Won't do this	Thinking about doing this	Plan to do in the future
225	Mostly concerned about the elderly, home bound, and special needs populations.	Yes		Alert/warning system;Shelters: Emergency or Storm shelters;Public education and outreach;	Plan to do in the future	Plan to do in the future	Done this	Can't do this	Thinking about doing this	Thinking about doing this	Thinking about doing this
226	Emergency personnel cannot get to my area because a train is going over the only way into my community.	Yes		Maintain/improve public roads, bridges, other transportation features;More emergency services;	Thinking about doing this	Done this	Done this	Can't do this	Won't do this	Done this	Done this
227	Unprepared public panic	Yes	2005 Wilton Wildfire accident. My husband was 1 of 3 injured firefighters. Our life will never be the same. Ptsd that won't go away.	Public education and outreach;	Done this	Done this	Plan to do in the future	Done this	Can't do this	Plan to do in the future	Won't do this
228	Bridge south of town.	Yes		Build/improve flood protection;Maintain/improve public roads, bridges, other transportation features;Debris/tree removal;Alert/warning system;	Won't do this	Done this	Done this	Plan to do in the future	Can't do this	Plan to do in the future	Can't do this
229		Yes	Tornado and hails storm, emmons county.		Won't do this	Thinking about doing this	Thinking about doing this	Can't do this	Can't do this	Can't do this	Can't do this
230		Yes	Lived in Pass Christian, MS when Hurricane Camille hit in 1969. Lost friends, school, church and much more. Here in ND we've had tornadoes, hail storms, blizzards. It all impacts the communities and residents, but not something preventable. For the most part, I think our emergency and weather warning systems do a good job of keeping us informed, should we choose to pay attention.	Alert/warning system;Shelters: Emergency or Storm shelters;Debris/tree removal;Keep or expand open spaces & natural areas;Maintain/improve public roads, bridges, other transportation features;Protect natural resources;		Done this	Done this	Can't do this	Done this	Done this	
231	Roads for emergency vehicles	Yes	Rescuing stranded motorist and medical emergencies	Alert/warning system;Shelters: Emergency or Storm shelters;Maintain/improve public roads, bridges, other transportation features;Public education and outreach;	Thinking about doing this	Plan to do in the future	Done this	Plan to do in the future	Won't do this	Thinking about doing this	Can't do this
232	Winter weather and traveling	No		Shelters: Emergency or Storm shelters;Build/improve flood protection;Maintain/improve public roads, bridges, other transportation features;	Done this	Thinking about doing this	Done this	Won't do this	Can't do this	Thinking about doing this	Done this
233	all apply on some level depending on the circumstances. Not really a fair question as who can legitimatelyF say any are without concerns if a disaster happens?	Yes	Flood of 97 in Fargo, Flood of 11 in Bismarck, Hail in Bismarck 01 and 04, Tornado November of 01 in Bismarck, Micro-Bursts between 93-99, numerous snow events	All of the above when it applies and appropriate ;	Done this	Done this	Done this	Won't do this	Plan to do in the future	Done this	Done this
234	Honestly all of the above except for intersections because we have no stop lights in Hettinger.	Yes	High hail area so expense of what insurance doesn't pay for house and auto damage. Length of time it takes to get repairs done due to long lists. Also fraudulent or poor workmanship crews moving into the community.	Debris/tree removal;Maintain/improve public roads, bridges, other transportation features;	Done this	Done this	Done this			Done this	
235		No		Alert/warning system;Shelters: Emergency or Storm shelters;Build/improve flood protection;Maintain/improve public roads, bridges, other transportation features;More emergency services;	Plan to do in the future	Plan to do in the future	Plan to do in the future	Won't do this	Won't do this	Thinking about doing this	Thinking about doing this
236	Entire county not just a specific community I live in	Yes	High winds which downed a very large tree in the back yard. Several blizzards and many road disasters as a employee for Stark County	Alert/warning system;Shelters: Emergency or Storm shelters;Debris/tree removal;Maintain/improve public roads, bridges, other transportation features;	Done this	Done this	Plan to do in the future	Done this	Done this	Plan to do in the future	Can't do this
237	Public school, nursing home, hospital, college, daycares	No		Public education and outreach;Alert/warning system;Protect natural resources;	Done this	Thinking about doing this	Thinking about doing this	Done this	Thinking about doing this	Thinking about doing this	Done this
238	South side of town in flood situations	No		Alert/warning system;Shelters: Emergency or Storm shelters;Debris/tree removal;Build/improve flood protection;More emergency services;	Thinking about doing this	Plan to do in the future	Plan to do in the future	Won't do this	Won't do this	Won't do this	Won't do this
239		Yes		Shelters: Emergency or Storm shelters;Alert/warning system;Public education and outreach;	Plan to do in the future	Thinking about doing this	Plan to do in the future	Plan to do in the future	Plan to do in the future	Plan to do in the future	Plan to do in the future
240	My house	Yes		Alert/warning system;	Thinking about doing this	Thinking about doing this	Thinking about doing this	Can't do this	Done this	Thinking about doing this	Can't do this
241		No		Alert/warning system;Maintain/improve public roads, bridges, other transportation features;More emergency services;Public education and outreach;Shelters: Emergency or Storm shelters;	Done this	Thinking about doing this	Thinking about doing this	Won't do this	Won't do this	Won't do this	Can't do this
242	Roads and property	Yes	Tornado but it was when I was working for Belcourt Ambulance in July of 2008. It was a reality check. I was also working for Spirit Lake Ambulance when all the roads went under water from Devils Lake along with the evacuation in Grandforks from the flooding from Red River. We handled it well considering the impact it had on both communities.	Alert/warning system;Shelters: Emergency or Storm shelters;More emergency services;Improve water quality;	Done this	Thinking about doing this	Thinking about doing this	Thinking about doing this	Thinking about doing this	Can't do this	Can't do this

ID	When severe weather or other dangerous events happen, are there areas of your community you worry about? (Examples may include: certain access roads, intersections, bridges, levees or other infra...	Have you or anyone in your household experienced any disasters or severe storm events? (Data will remain anonymous and only used for planning purposes.)	If yes, please share your story with us. You can describe the disaster or severe event you experienced and include details such as the type of event, when it happened, where you saw damage, and ho...	What steps should the government take to reduce risks in your area? (Check all that apply.)	Attend information meetings on natural disasters	Make a household emergency plan	Prepare a home supply kit, "go bag" or store supplies	Create a buffer around your home to protect against wildfire	Purchase hazard insurance (flood, earthquake, etc.)	Make a disaster plan with your neighbors (phone tree, home checks, etc.)	Protect and strengthen your home or business structurally (i.e., elevate it to keep it dry during a flood)
243	yes, emergency services, disabled support services for those living independently, rural roads inaccessible due to being impassable.	Yes	Severe winter blizzards: loss of electricity, impassable roads thus not accessible to get to doctor for medical needs or the delivery of medicines to mailbox and propane to consumers.	More emergency services;Protect electric and communications grid, ;Maintain/improve public roads, bridges, other transportation features;	Won't do this	Done this	Done this	Done this	Can't do this	Done this	Can't do this
244		Yes	I have experienced a few power outages that have occurred from ice and snow. I have also experienced blocked roads for several days from winter storms.	Alert/warning system;Public education and outreach;		Plan to do in the future	Plan to do in the future	Done this	Won't do this	Thinking about doing this	Can't do this
245	Snow removal on local highways are often slowly starting & poor quality; common to find county roads in better condition or accessible sooner. Extra diversion/protection is also needed in some areas of roadways to reduce drifting (like drifts higher than large vehicles that cover full lane or more). Winter road closurers on I-29 can reduce access to rural citizens in the event of emergencies needing the larger hospital services within cities. Many of our communities already struggle with maintaining enough EMT/EMS personnel, thus other citizens still need access to these roads in events of non-life threatening emergencies.	No		Build/improve flood protection;Maintain/improve public roads, bridges, other transportation features;Shelters: Emergency or Storm shelters;Protect natural resources;Keep or expand open spaces & natural areas;	Won't do this	Thinking about doing this	Thinking about doing this	Won't do this	Won't do this	Thinking about doing this	Thinking about doing this
246		Yes		Shelters: Emergency or Storm shelters;Maintain/improve public roads, bridges, other transportation features;Keep or expand open spaces & natural areas;More emergency services;Public education and outreach;	Done this	Plan to do in the future	Plan to do in the future	Plan to do in the future	Plan to do in the future		Done this
247	My family and home	Yes	H2s leaks constantly, chemical spills at rail facilities	Alert/warning system;Consider residents in zoneing ;Protect natural resources;	Thinking about doing this	Done this	Done this	Done this	Done this	Thinking about doing this	Done this
248	Life of everything	Yes	I have watched several planes cloud seeding since biden took office its been getting worse and worse, some days clear until they start spraying in a grid pattern then 3 hours later completely cloudy. I have videos and pictures of it all so its not crop dusting planes its big jets and it's not passenger jets because we don't have the air traffic to justify it. You can watch them fly a grid pattern as of they are spraying a crop and they cover a certain amount of the sky and move on typically they stay close to the direction of the where the sun will mainly be so they make sure to block the sun so it effects our plants and human overall health because we need sunlight for health reasons. You government programs are sickening.	Government should be eliminated I can handle my own self just fine.;	Won't do this	Won't do this	Won't do this	Won't do this	Won't do this	Done this	Won't do this
249	Yes high ground	No		Alert/warning system;Shelters: Emergency or Storm shelters;Build/improve flood protection;Maintain/improve public roads, bridges, other transportation features;	Won't do this	Thinking about doing this	Thinking about doing this	Can't do this	Done this	Won't do this	Can't do this
250	Access to roads	No		Maintain/improve public roads, bridges, other transportation features;Protect natural resources;Alert/warning system;Shelters: Emergency or Storm shelters;Debris/tree removal;	Thinking about doing this	Plan to do in the future	Plan to do in the future	Thinking about doing this	Plan to do in the future	Plan to do in the future	Can't do this
251	Elderly and other vulnerable people. Apt. Dwellers. New North Dakotans.	Yes	Blizzards-can't get supplies easily.	Shelters: Emergency or Storm shelters;Build/improve flood protection;Keep or expand open spaces & natural areas;Improve water quality;Protect natural resources;Public education and outreach;Maintain/improve public roads, bridges, other transportation features;Stricter environmental regulations ;	Thinking about doing this	Done this	Done this	Can't do this	Won't do this	Won't do this	Won't do this
252	Residential beside industry	Yes	Gas leaks, chemical spills, derailment, tornadoes.	Keep or expand open spaces & natural areas;Protect natural resources;More emergency services;Public education and outreach;	Done this	Done this	Can't do this	Thinking about doing this	Can't do this	Plan to do in the future	Won't do this
253	The poorer economic zones that do not always have the capacity to evacuate.	Yes	Several severe winter storms (blizzard of 1991), Flood of 1997, the Minot flood of 2011, several more...	Keep or expand open spaces & natural areas;Protect natural resources;Public education and outreach;Shelters: Emergency or Storm shelters;In certain disaster prone urban areas, consider retreat from that area.;	Plan to do in the future	Done this	Plan to do in the future	Plan to do in the future	Thinking about doing this	Plan to do in the future	Thinking about doing this
254	Crops and the preparedness of schools where young children are	Yes	August 1st, 2023, had a major hailstorm event in williams country that spanded from north of Williston 13 miles to the southeast for the entire length of the country. Destroyed 90% of the crops in our farm and 100s of thousands of acres and the state has kept quiet about it because of weather modification in our county. The impact from this storm affected hundreds of farmers, destroyed crops, destroyed buildings, and no disaster was declared. Another storm was around June 10th, 2021, Williston received a major hail storm that caused the damage to nearly roof in the city, and millions of dollars of damage to vehicles and buildings. Nothing was declared an emergency in this case either because we have weather modification.	Alert/warning system;Shelters: Emergency or Storm shelters;Debris/tree removal;Get rid of weather modification in North Dakota!;	Plan to do in the future	Plan to do in the future	Plan to do in the future	Thinking about doing this	Thinking about doing this	Plan to do in the future	Thinking about doing this
255	Any public building being targeted for violence. Road closure due to hazardous spills.	No		Keep or expand open spaces & natural areas;Protect natural resources;Public education and outreach;	Done this	Done this	Done this	Thinking about doing this	Thinking about doing this	Thinking about doing this	Thinking about doing this
256	We take care of ourselves, always have, always we probably have to. Weather radar runs 5-10 minutes late, which is usually too late.	Yes	Storm took roof off our house and other people's too... nobody cared/s, there were no early storm warnings.	Put the criminals in jail, put tweakers in treatment.;		Done this	Done this	Done this	Won't do this	Done this	Done this
257	Fire station , young children	No		Alert/warning system;More emergency services;Public education and outreach;	Done this	Plan to do in the future	Plan to do in the future	Thinking about doing this	Plan to do in the future	Thinking about doing this	Thinking about doing this
258	Roads hospitals infrastructure peoplepoluce fire	Yes	Floods	Alert/warning system;Debris/tree removal;Build/improve flood protection;Maintain/improve public roads, bridges, other transportation features;More emergency services;Protect natural resources;Public education and outreach;Finish Tyler parkway Bridge for more access from nw bismarck;		Thinking about doing this	Thinking about doing this				
259	Hospitals and long-term care facilities, homeless shelters, childcare facilities	No		Maintain/improve public roads, bridges, other transportation features;Public education and outreach;Alert/warning system;	Done this	Done this	Done this	Thinking about doing this	Done this	Plan to do in the future	Thinking about doing this
260	Access to shelters. It would also be helpful to have public outreach and education discuss ways to respond during tornadoes. Personal preparedness for all hazards is a topic that always needs reinforcing since complacency can result between emergencies.	Yes	Homeownership is not without its emergencies. A few years ago, as a new homeowner, I learned how much damage could occur when water infiltrated my basement after a heavy downpour. We also experienced a hail event in which stones came down fast and furious, covering the lawn and damaging the roof. The underpasses of Seventh and Ninth Street in Bismarck were clogged with hail stones.	Shelters: Emergency or Storm shelters;Protect natural resources;More emergency services;Public education and outreach;Alert/warning system;	Done this	Done this	Done this	Plan to do in the future	Done this	Plan to do in the future	Done this
261		Yes	Grand Forks Floods of 1979 and 1997		Thinking about doing this	Plan to do in the future	Plan to do in the future	Can't do this	Done this	Plan to do in the future	Done this

ID	When severe weather or other dangerous events happen, are there areas of your community you worry about? (Examples may include: certain access roads, intersections, bridges, levees or other infra...	Have you or anyone in your household experienced any disasters or severe storm events? (Data will remain anonymous and only used for planning purposes.)	If yes, please share your story with us. You can describe the disaster or severe event you experienced and include details such as the type of event, when it happened, where you saw damage, and ho...	What steps should the government take to reduce risks in your area? (Check all that apply.)	Attend information meetings on natural disasters	Make a household emergency plan	Prepare a home supply kit, "go bag" or store supplies	Create a buffer around your home to protect against wildfire	Purchase hazard insurance (flood, earthquake, etc.)	Make a disaster plan with your neighbors (phone tree, home checks, etc.)	Protect and strengthen your home or business structurally (i.e., elevate it to keep it dry during a flood)
262	Infrastructure - especially the electrical grid	Yes	Grand Forks Floods of 1979 and 1997	Shelters: Emergency or storm shelters; Build/improve flood protection; More emergency services	Thinking about doing this	Plan to do in the future	Plan to do in the future	Can't do this	Done this	Plan to do in the future	Done this
263	Schools, nursing homes	No		Keep or expand open spaces & natural areas; Maintain/improve public roads, bridges, and other transportation features; public education and outreach	Done this	Thinking about doing this	Thinking about doing this	Won't do this	Can't do this	Thinking about doing this	Thinking about doing this
264	Hospitals, power infrastructure	Yes		Alter/warning system; Shelters: Emergency or Storm shelters; Public education and outreach	Done this	Done this	Done this	Can't do this	Won't do this	Can't do this	Plan to do in the future

ID	What additional actions do you plan to take to reduce the risk to your home or business from natural hazards (example: floods, earthquakes, winter storms)?	Do you have any suggestions for how the state can engage with more diverse and under-represented groups and individuals? Are there any specific groups you think the state should engage with?	How do you normally get information about a disaster in your area?	Are there any other comments or stories you would like to share with us about hazards?
1	Spread information to others regarding available resources for recovery and what would be done in an emergency situation. I always use mass utility disruption as an example.	Target typically underserved populations and actually go to meet with them.	Friends, family, word of mouth;Websites - local government pages;Social Media (Facebook, Twitter, Instagram, etc);Emergency alert subscriptions;Text messages;	
2	.		Social Media (Facebook, Twitter, Instagram, etc);Text messages; Friends, family, word of mouth;	
3			Social Media (Facebook, Twitter, Instagram, etc);	
4			Friends, family, word of mouth;Radio;Websites - local government pages;Websites - private;Social Media (Facebook, Twitter, Instagram, etc);Text messages;Emergency alert subscriptions;	
5			TV;Social Media (Facebook, Twitter, Instagram, etc);	
6	None	Government needs to work with residents more. Especially volunteer, nonprofit teams. We have a search and rescue group here that government agencies seem to be scared of because it's an issue that they haven't adequately prepared or trained for yet that group has but government won't work with them. Why?	Social Media (Facebook, Twitter, Instagram, etc);	Our population has grown. Missing people are and have been a problem. Agencies need to stop ignoring the private sector and volunteer groups and work together.
7	Plan and prep for possibilities	Facilities that house the mentally or physically handicapped - assisted living situations - employees and first responders may not be properly equipped to assist them in a large scale disaster	Friends, family, word of mouth;TV;Radio;Websites - local government pages;Websites - private;Social Media (Facebook, Twitter, Instagram, etc);Text messages;Emergency alert subscriptions;	From my own experience in CA, limited preparation is as ineffective as no preparation
8	Make sure everyone in the household has some method of receiving message of alerts.		Emergency alert subscriptions;	
9			Websites - local government pages;Social Media (Facebook, Twitter, Instagram, etc);Emergency alert subscriptions;	
10			TV;Radio;Social Media (Facebook, Twitter, Instagram, etc);	
11	Generator	Easier access to grants	Text messages;Emergency alert subscriptions;TV;	
12	Constantly updating policy and mitigation plans as new threats are revealed. i.e. didn't think the threat of a train derailment was high enough to have a plan for, but not that they are happening every couple weeks, we have added one to our plans.	Head out to public events more. Seen displays at the state fair, but having a roaming team at smaller events like county fairs discussing local mitigation plans would garner more attention overall.	Emergency alert subscriptions;Social Media (Facebook, Twitter, Instagram, etc);	
13			TV;Radio;Websites - local government pages;Social Media (Facebook, Twitter, Instagram, etc);Text messages;Emergency alert subscriptions;	
14			Friends, family, word of mouth;Social Media (Facebook, Twitter, Instagram, etc);Text messages;	
15	we have discussed getting a generator for power outages, as well as propane for heater backup	tribal members.	Friends, family, word of mouth;TV;Websites - local government pages;Websites - private;Social Media (Facebook, Twitter, Instagram, etc);Emergency alert subscriptions;	
16	We just put new shingles on our house & plan on putting new windows in, next month.	utilize Ham Radio Operators & Organizations, including: "RACES" Radio Amateur Civil Emergency Service "ARES" Amateur Radio Emergency Service "CERT" Community Emergency Response Team & a relatively new organization, "AUXCOM" which simply stands for Auxiliary Communications. Some counties are very good at utilizing this resource, while some others refuse to work with them. I was the County RACES officer, from 91 to 21; The ARES County EC Emergency Coordinator, from 91 to 14; & District EC from 92 to 14. As DEC I was in charge of ARES Operations in 5 Counties. Several years ago, one of the County EMs, told me, "We will never call on you, no matter what. It would make the county look bad, if we had to depend on a bunch of 'AMATEURS' to do our job.". That's why we prefer the term "Ham Radio" instead of "Amateur Radio". Most Hams	Friends, family, word of mouth;TV;Social Media (Facebook, Twitter, Instagram, etc);Text messages;Emergency alert subscriptions;	No
17		Small towns and townships	Friends, family, word of mouth;TV;Radio;Websites - local government pages;Text messages;	
18	Always rotate stock of provisions nd fresh water.	Emergency Managers need to be educated on all aspects of their job and just because they are 50% paid by the County doesn't mean they don't have responsibilities to the townships and cities under they purvey.	TV;Websites - local government pages;Emergency alert subscriptions;	Too many to list here, as I was fulltime with NDNG for 30 years hence just about every Flood and Snow disaster I had a part of.

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19			Social Media (Facebook, Twitter, Instagram, etc);Emergency alert subscriptions;Text messages;	
20	Looking at purchasing a back up generator that can run the house, but they are incredibly expensive.	Williston is a very diverse area. Simply going into those diverse businesses and engaging with owners would be a great place to start.	Social Media (Facebook, Twitter, Instagram, etc);Text messages;Emergency alert subscriptions;	
21				
22	Looking into alternative heating solutions, including a generator.		Radio;Websites - local government pages;Social Media (Facebook, Twitter, Instagram, etc);	
23	Replace dead trees to reduce fire Harare and increase protection from blown snow.	There are many older people in the community who rely upon various elder services. Those services should be more prepared for emergency situations.	Emergency alert subscriptions;Text messages;Fire/EMS dispatch;	The worst hazard seems to be the lack of adequate emergency management/planning
24	None	If they haven't already taken what's been offered it's their own fault.	Social Media (Facebook, Twitter, Instagram, etc);Text messages;	
25			Friends, family, word of mouth;TV;Radio;Newspaper;Websites - local government pages;Social Media (Facebook, Twitter, Instagram, etc);Emergency alert subscriptions;Text messages;	
26	Sump pumps	Apartment dwellers and mobile home communities	Websites - local government pages;Social Media (Facebook, Twitter, Instagram, etc);	
27	We got a snowblower	Yes	Social Media (Facebook, Twitter, Instagram, etc);YouTube ;	I don't have local tv access, and don't have a radio in my home. I only have myself to rely on to check the weather.
28			Friends, family, word of mouth;TV;Radio;Text messages;Emergency alert subscriptions;	
29	Stock up on food, water and fuel. Plan travel if needed around the projected impacts of the storm.	No, and stop wasting time and resources in these areas.	Friends, family, word of mouth;Websites - local government pages;Websites - private;Social Media (Facebook, Twitter, Instagram, etc);Emergency alert subscriptions;	
30			TV;Social Media (Facebook, Twitter, Instagram, etc);Text messages;	
31	nothing	education and outreach	TV;Websites - local government pages;Websites - private;Social Media (Facebook, Twitter, Instagram, etc);Emergency alert subscriptions;	no
32	We trim trees so they're not likely to fall on buildings	I'm most concerned with people on the reservations not having supplies, so they're on roads during winter storms to drive to Walmart for necessities 20 miles away. Our county does a good job of closing that road early to reduce risks, but education may help that population.	Social Media (Facebook, Twitter, Instagram, etc);Websites - local government pages;	
33			TV;Social Media (Facebook, Twitter, Instagram, etc);Emergency alert subscriptions;	
34	N/A		TV;Text messages;	No
35		There needs to be a focus on inclusion Fargo has a large immigrant population, they are much more at risk in a disaster	TV;Social Media (Facebook, Twitter, Instagram, etc);Emergency alert subscriptions;	
36	I rent in a multi-unit community. I'm limited in my ability to do any structural mitigation. However, I have taken steps to prepare financially and socially.	Pay attention and acknowledge our more marginalized community members. We need to work with advocates for the house less and those experiencing poverty. We need to own up to the racism and bias built into our systems and policies. We need to empower the tribes and provide resource support so that they can be effective. The mental health resources for the state are abysmal—which does not bode well for individual and household recovery post-disaster.	Radio;Websites - local government pages;Social Media (Facebook, Twitter, Instagram, etc);Text messages;Emergency alert subscriptions;Newspaper;Websites - private; Friends, family, word of mouth;TV;	
37		Strengthen existing support services and infrastructure and add new services and infrastructure through strategic planning.	Websites - local government pages;Emergency alert subscriptions;	
38			Emergency alert subscriptions;Websites - private;Social Media (Facebook, Twitter, Instagram, etc);	I often use Twitter to get real-time updates.
39	none	education and shelters	Websites - local government pages;Social Media (Facebook, Twitter, Instagram, etc);Text messages;Emergency alert subscriptions;	
40		Work with groups and agencies that serve these people	Friends, family, word of mouth;TV;Websites - local government pages;Social Media (Facebook, Twitter, Instagram, etc);Emergency alert subscriptions;	

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41		Street Fairs, other community events	Friends, family, word of mouth;Websites - local government pages;Websites - private;	
42		There should be heat and tornado shelters in every major town for folks who live in trailer homes. It is ridiculous that we don't have this already.	Friends, family, word of mouth;TV;Websites - local government pages;Social Media (Facebook, Twitter, Instagram, etc);Text messages;Emergency alert subscriptions;Weather Apps;	
43	Get snowblower and winter survival gear ready and in good shape.	Teenagers/pre-teens/young adults. What to so in winter, rain, wind and flooding situations if the parents are not home or if they are driving alone and a storm or emergency happens.	Friends, family, word of mouth;TV;Radio;Websites - local government pages;Social Media (Facebook, Twitter, Instagram, etc);Text messages;Emergency alert subscriptions;	
44	N/A we've done all we can		TV; Friends, family, word of mouth;Emergency alert subscriptions;	
45	Just keep supplies on hand		Social Media (Facebook, Twitter, Instagram, etc);Text messages;Emergency alert subscriptions;Radio; Friends, family, word of mouth;TV;	
46			TV;Radio;Social Media (Facebook, Twitter, Instagram, etc);Text messages;Emergency alert subscriptions;	
47	None	No	Radio;Websites - local government pages;Social Media (Facebook, Twitter, Instagram, etc);	No
48				
49		AARP and senior citizens	TV;Social Media (Facebook, Twitter, Instagram, etc);	
50	Nothing.	I'm not sure the diverse groups, immigrants, refugees, etc. are looking for any specific help or engagement. The ones I have known are living their lives, and are happy to be in America and experience American life. They share experiences with loved ones back home, etc. Making them the focus of attention or engaging them at the state level, might not really help them adjust. It may even confuse them. A more helpful approach would be to have resources -- a friendly someone (a number or place) they can contact with their questions about what they need.	TV;Social Media (Facebook, Twitter, Instagram, etc);The national news web pages -- msn local news feed.;Newspaper;	Thankfully, we in ND have little to fear from natural disasters, save tornadoes/wind, hail and snow/flood which are rare occurances. We are spared the headaches of many people who deal with earthquakes, hurricanes and flash floods on a regular basis. Also the open plains are susceptible to grass fires, but not nearly the scale of wildfires in remote areas.
51	I plan on getting a steel roof to prevent roof leaks from ice dams every winter. I bought an air purifier for the constant, poor air quality from wildfires.	Maybe try to convince all the people of North Dakota that climate change is actually a real issue and we need to start preparing.	Social Media (Facebook, Twitter, Instagram, etc);Text messages;Emergency alert subscriptions;TV; Friends, family, word of mouth;	
52	Buy an emergency whole home generator	In some ways people with out much may be easier to protect as they would have less to lose. Finding them and communicating and providing transport and shelters will require planning an work.	Friends, family, word of mouth;Websites - local government pages;Social Media (Facebook, Twitter, Instagram, etc);Text messages;Emergency alert subscriptions;	First and foremost provide information for individuals and families so they can plan and prepare if they choose. Don't become a government like Maui, where hazards were known about but not mitigated and people were to be reluctant to take action. And don't practice promoting for the sake of promoting. Have a meritocracy where competent people are in place. A lot of time when people reach a level of management they are afraid to make a decision because of their GOV benefits do not become those people.
53	Resource stockpiling		Websites - local government pages;Websites - private;Social Media (Facebook, Twitter, Instagram, etc);	
54	Vote for good environmental policy, pay my proper taxes	Promote more women in natural resources workplace. Pay all natural resource workers better.	Websites - local government pages;	
55			Radio;Websites - local government pages;Social Media (Facebook, Twitter, Instagram, etc);Text messages;Emergency alert subscriptions;	
56			Radio;TV; Friends, family, word of mouth;Websites - local government pages;Social Media (Facebook, Twitter, Instagram, etc);Emergency alert subscriptions;	
57			TV;Social Media (Facebook, Twitter, Instagram, etc);Websites - local government pages;Emergency alert subscriptions;	
58		Everyone should be invoked without the lies told by the Tax payers employees.	Radio;	Fire Joel he is incompetent at best.
59	My home is not in a flood area. We have weathered many a winter storm so no worries there.	Native American Tribes	Radio;Text messages;Emergency alert subscriptions;Social Media (Facebook, Twitter, Instagram, etc);TV;	
60	Remove large and old trees	not right now	TV;Radio;Websites - local government pages;Websites - private;Social Media (Facebook, Twitter, Instagram, etc);Text messages;Emergency alert subscriptions;	none
61		People with low incomes: reach out where they live; recent immigrants: through international organizations and churches.	Radio;TV;Social Media (Facebook, Twitter, Instagram, etc);Text messages;	
62		Young families.	Websites - local government pages;Websites - private;Text messages;Emergency alert subscriptions;TV;	
63	Not much can be done to reduce natural hazards just prepare for the possibilty		Radio;Emergency alert subscriptions; Friends, family, word of mouth;Observation;	

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64	Common sense	What everyone needs is LESS GOVERNMENT ENGAGEMENT...I'm 79 years old and can count on one hand the instances in which government involvement has actually been positive.	Radio;	
65			Friends, family, word of mouth;TV;Websites - local government pages;Websites - private;Social Media (Facebook, Twitter, Instagram, etc);Text messages;Emergency alert subscriptions;	
66	Installing a backup power supply		Newspaper;Radio;Websites - local government pages;Social Media (Facebook, Twitter, Instagram, etc);	
67	Replace my roof with a metal one.	Caregivers of people with disabilities.	TV;Radio;Social Media (Facebook, Twitter, Instagram, etc);	No
68			Friends, family, word of mouth;TV;Radio;Text messages;	
69	Would love to help train the town on how to prepare for the natural disasters that are possible in m community.	There needs to be more preparation for disasters. The county next to us does plan one natur we l disaster a year.	Text messages;Emergency alert subscriptions;TV;My own education and education from being a safety coordinator as a previous job. ;	N/A
70			Friends, family, word of mouth;TV;Radio;Newspaper;Websites - local government pages;Text messages;	
71			Emergency alert subscriptions;Websites - local government pages;TV;Social Media (Facebook, Twitter, Instagram, etc);	
72	Build up my dirt around the foundation on one corner of my house about 2 inches. This would get me out of the projected 500 year flood zone.	Listen to the locals about the past instead of just giving lip service, and doing it the way they want to. Could save people and the state a lot of money.	Emergency alert subscriptions;Text messages;Radio;	Nope - they don't listen anyway.
73		New residents who may not be familiar with storm hazards in our community or may have language barriers that prevent them from understanding alert information	Friends, family, word of mouth;TV;Radio;Social Media (Facebook, Twitter, Instagram, etc);Text messages;	
74		I think schools should make a greater effort to educate children on these subjects so when they grow up they have safe practices.	Radio;Social Media (Facebook, Twitter, Instagram, etc); Friends, family, word of mouth;Husband is a LEO so he tells me too.;Text messages;Emergency alert subscriptions;	
75	Tree rows for wind blocks winter storms, back up generator		Radio; Friends, family, word of mouth;Social Media (Facebook, Twitter, Instagram, etc);Text messages;	My experience in the energy industry makes me believe we will face electrical grid reliability issues. I believe this is something our communities would be very unprepared for with our normal extremes in weather we take for granted having reliable electricity to keep us comfortable. The grids are frequently operating at or near capacity the push for renewables has made this way to frequent. The potential for man made disasters seems to also have increased in recent years across the country. Example A major train derailment in downtown Bismarck or any other city the railway passes directly through would be absolutely catastrophic.
76	None.	No.	TV;	No
77			Emergency alert subscriptions;	
78			Friends, family, word of mouth;Radio;Websites - local government pages;Websites - private;Social Media (Facebook, Twitter, Instagram, etc);Text messages;Emergency alert subscriptions;	
79			Friends, family, word of mouth;TV;Websites - private;Social Media (Facebook, Twitter, Instagram, etc);	
80			Friends, family, word of mouth;Radio;Social Media (Facebook, Twitter, Instagram, etc);Text messages;Emergency alert subscriptions;	
81	Plan for it	N/a	TV; Friends, family, word of mouth;Social Media (Facebook, Twitter, Instagram, etc);	
82			Social Media (Facebook, Twitter, Instagram, etc);Text messages;Emergency alert subscriptions; Friends, family, word of mouth;	
83	I live in an apt, so an escape route with my pets and a pack of supplies.	The disabled community and those suffering from mental health issues are groups I think the state should engage with. Historically women of color are also largely underrepresented.	Friends, family, word of mouth;Emergency alert subscriptions;	
84	We've put in a sump pump	No	Social Media (Facebook, Twitter, Instagram, etc);Text messages;TV;	No
85	Renters insurance	Homeless	Friends, family, word of mouth;Social Media (Facebook, Twitter, Instagram, etc);Emergency alert subscriptions;	

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86			Friends, family, word of mouth;Websites - local government pages;Social Media (Facebook, Twitter, Instagram, etc);Text messages;	
87	Keep snow away from outdoor utilities		Friends, family, word of mouth;TV;Social Media (Facebook, Twitter, Instagram, etc);Text messages;	
88			TV;Radio;Text messages;Emergency alert subscriptions;	
89	None come to mind, we live and work high enough to avoid flooding. Winter storms have been weathered.	Don't know.	Websites - local government pages;Emergency alert subscriptions;TV;	
90	have survival items.		TV;Radio;Websites - local government pages;Websites - private;Social Media (Facebook, Twitter, Instagram, etc);Emergency alert subscriptions;	
91			TV;Radio;	
92	I have no plan.	None.	Text messages;Radio; Friends, family, word of mouth;Newspaper;	No
93	NA	NA	Websites - local government pages;Emergency alert subscriptions;TV;	NA
94		Add some curriculum in public schools or during parent teacher conferences if parents would like to attend.	Social Media (Facebook, Twitter, Instagram, etc); Friends, family, word of mouth;	
95	Have backup systems for power and water	Do emergency planning for individuals with disabilities and special health needs.	Emergency alert subscriptions;Text messages;Social Media (Facebook, Twitter, Instagram, etc);Websites - local government pages; Friends, family, word of mouth;	No
96			TV;Radio;Newspaper;Websites - local government pages;Social Media (Facebook, Twitter, Instagram, etc);Text messages;Emergency alert subscriptions;	
97	Have our generator easily accessible and ready to use. Keep a store of shelf-safe food on hand.	People with disabilities, Indigenous populations	Social Media (Facebook, Twitter, Instagram, etc);Text messages;TV;Websites - local government pages;	
98	We are prepared for winter events.		TV;Text messages; Friends, family, word of mouth;Websites - local government pages;Radio;Newspaper;	
99			Friends, family, word of mouth;Radio;Websites - local government pages;Emergency alert subscriptions;	
100	Protect property from looters, fortifying and security.	Concentrate on majority vs. overlooking them to address the few.	Websites - local government pages;Emergency alert subscriptions;TV;	No
101			Radio;	
102			Friends, family, word of mouth;TV;Radio;Newspaper;Websites - local government pages;Social Media (Facebook, Twitter, Instagram, etc);Text messages;Emergency alert subscriptions;Websites - private;	
103		There is a lack of storm shelters located near trailer parks in the area for the amount of people that would need it.	TV;Social Media (Facebook, Twitter, Instagram, etc);Text messages;Websites - local government pages;Websites - private;Radio;	
104			TV;Social Media (Facebook, Twitter, Instagram, etc);	
105			TV;Radio;	
106	Install a large snow fence is in the future.	Those that live out of the city jurisdiction that are having issues with their property.	Friends, family, word of mouth;TV;Newspaper;Websites - private;Social Media (Facebook, Twitter, Instagram, etc);Text messages;Emergency alert subscriptions;	No
107	making shelter in place "bags", Make sure we have fuel for generators, power cords on hand for correct operation of the generators, food supplies	make sure local governing bodies are aware of what is available	Emergency alert subscriptions;	
108			Friends, family, word of mouth;TV;Radio;Websites - local government pages;Social Media (Facebook, Twitter, Instagram, etc);	
109			TV;Social Media (Facebook, Twitter, Instagram, etc);	
110			Websites - local government pages;TV; Friends, family, word of mouth;Emergency alert subscriptions;	
111			Friends, family, word of mouth;Radio;Websites - local government pages;Social Media (Facebook, Twitter, Instagram, etc);Text messages;	
112		HOMELESS AND UNDERSERVED POPULATION ADVOCATES. SCHOOL SYSTEMS.	TV;Websites - local government pages;Social Media (Facebook, Twitter, Instagram, etc);Emergency alert subscriptions;	
113			TV;Radio;Websites - local government pages;Text messages;Emergency alert subscriptions;	

ID	What additional actions do you plan to take to reduce the risk to your home or business from natural hazards (example: floods, earthquakes, winter storms)?	Do you have any suggestions for how the state can engage with more diverse and under-represented groups and individuals? Are there any specific groups you think the state should engage with?	How do you normally get information about a disaster in your area?	Are there any other comments or stories you would like to share with us about hazards?
114	I don't care. I'm in the 60% of Fargo residents who rent.		Websites - local government pages;Newspaper;Radio;TV;	Folks in North Dakota weren't willing to get vaccinated in order to stay alive, so I don't anticipate they will be willing to do much else. They will wait until the disaster and then complain that the government should have done more.
115	None	No	Social Media (Facebook, Twitter, Instagram, etc);	No
116			Websites - private;Social Media (Facebook, Twitter, Instagram, etc);Text messages;TV;	Many communities no longer have grocery stores or medical supplies it would be nice if the fire departments could have a stock in case of emergency.
117	Clean out the gutters... high on a hill so flooding is less of an issue		Websites - local government pages;Emergency alert subscriptions;	
118			Websites - local government pages;Social Media (Facebook, Twitter, Instagram, etc);Text messages;Emergency alert subscriptions;	
119	I am prepared to evacuate in advance if given the proper warning.	I think the Williston City council and mayor should be investigated for the corruption within the city	Radio;Emergency alert subscriptions;Websites - local government pages;	
120	N/A	Not at this time	Friends, family, word of mouth;TV;Websites - local government pages;Social Media (Facebook, Twitter, Instagram, etc);	No
121			TV;Radio;Websites - local government pages;Emergency alert subscriptions;	
122	Be mindful of my sump pump maintenance. Shop ahead of storms for supplies lasting several days past end of storm expected duration.	Keep on supporting folks on the reservations.	Friends, family, word of mouth;TV;Radio;Websites - local government pages;Text messages;Emergency alert subscriptions;	I think ND does a great job with disaster mitigation.
123	I live in an apartment building so not a lot I can do	Engage with our minorities and poor populations. Grand Forks EM does a good job of putting out information in multiple languages that our most prominent minority populations speak, but adding more public storm shelters would help poor people in trailers and apartments have somewhere to go and be safe in the event of a tornado.	Friends, family, word of mouth;TV;Radio;Social Media (Facebook, Twitter, Instagram, etc);Text messages;	
124	Become more aware of my environmental surroundings.	Do more small community outreach programs.	TV;Radio;Websites - local government pages;Social Media (Facebook, Twitter, Instagram, etc);Emergency alert subscriptions;	no
125			Friends, family, word of mouth;TV;Radio;Social Media (Facebook, Twitter, Instagram, etc);Text messages;	
126	Keep trees in yard maintained and trimmed back so if wind causes them to fall, damage can hopefully be avoided.	No	TV;Radio;	No
127	Making advanced preparations for staying in our home for extended periods of time.		Friends, family, word of mouth;Radio;Emergency alert subscriptions;Text messages;Social Media (Facebook, Twitter, Instagram, etc);	
128			TV;Social Media (Facebook, Twitter, Instagram, etc);	
129			Social Media (Facebook, Twitter, Instagram, etc);	
130			Social Media (Facebook, Twitter, Instagram, etc);Text messages;Emergency alert subscriptions;	
131			TV;Websites - local government pages;Emergency alert subscriptions;	
132			Social Media (Facebook, Twitter, Instagram, etc);Text messages;Emergency alert subscriptions;	
133	I have done everything I can to protect my house.		Friends, family, word of mouth;TV;Radio;Social Media (Facebook, Twitter, Instagram, etc);Text messages;Emergency alert subscriptions;	
134			Radio;TV;Social Media (Facebook, Twitter, Instagram, etc);Emergency alert subscriptions;Text messages;	
135	I don't have a good answer for this, I always wondered about having my own back-up electric generator that is powered by natural gas. Although I have experienced power outages, they have always been of short duration.	There are so many - residents in congregate settings, homeless, tribal nations, new Americans, migrant workers, it takes boots on the ground to reach so many of these people.	TV;Radio;Newspaper;	There seems to be so much extreme weather in the last several years, floods, tornadoes, snow storms, heat. We have been lucky in North Dakota but we can't rely on luck. We seem to have a society that likes to react versus being proactive and that is a challenge.
136	None	No	TV;	No
137			Radio;	
138			Friends, family, word of mouth;TV;Radio;Newspaper;Social Media (Facebook, Twitter, Instagram, etc);	
139		No. Most of these groups are money grabs	Friends, family, word of mouth;Social Media (Facebook, Twitter, Instagram, etc);Text messages;Emergency alert subscriptions;	
140	Backup power		Emergency alert subscriptions;Text messages;TV;Radio;	

ID	What additional actions do you plan to take to reduce the risk to your home or business from natural hazards (example: floods, earthquakes, winter storms)?	Do you have any suggestions for how the state can engage with more diverse and under-represented groups and individuals? Are there any specific groups you think the state should engage with?	How do you normally get information about a disaster in your area?	Are there any other comments or stories you would like to share with us about hazards?
141	Planning		Social Media (Facebook, Twitter, Instagram, etc);Emergency alert subscriptions;	
142	I educate coworkers as much as possible on what to look for and how to listen to thier body while moving snow for signs of exhaustion. I always am double checking things around me and looking for things that could cause issues in the event of a natural disaster.	I believe we need to be reaching out to the school aged kids more. High schoolers need to start learning about these events and how to plan for them. Parents as well need to be getting involved. I do believe that if we can get school aged groups involved we could help relive anxiety about storms and events while also educating them on how they can help prepare and giving them career path ideas where they can learn about making a living while also making a difference in the safely level of the community.	Radio;Websites - local government pages;Text messages;Emergency alert subscriptions;	I didn't know Emergency Management was a thing until I knew someone who took that position and I took an interest in Emergency response. Since then I have taken steps to join EMS and also volunteer with the Emergency Management team in Williston. This is why I believe interacting with school aged groups is important. If no one knows it's a career possibility then we can't continue to grow and learn.
143			Websites - local government pages;Newspaper;Social Media (Facebook, Twitter, Instagram, etc);Websites - private;Text messages;Emergency alert subscriptions; Friends, family, word of mouth;	
144			Radio;TV; Friends, family, word of mouth;Social Media (Facebook, Twitter, Instagram, etc);Text messages;Emergency alert subscriptions;	
145			Newspaper; Friends, family, word of mouth;Emergency alert subscriptions;	
146			Social Media (Facebook, Twitter, Instagram, etc);Text messages;Emergency alert subscriptions;	
147			Friends, family, word of mouth;TV;Radio;Websites - local government pages;Social Media (Facebook, Twitter, Instagram, etc);Text messages;	
148	None	None	Friends, family, word of mouth;TV;Websites - local government pages;Social Media (Facebook, Twitter, Instagram, etc);	
149	My home is winterized but the landlord doesn't plow the parking lots and the city makes a path down the street with Four foot drifts on either side making it impossible to drive or get out of the parking lot.	Don't keep saying...keep it local and file complaints with your city/council...BECAUSE THERE ISNT AN ACCOUNTABILITY SYSTEM FOR NEGLIGENCE OF CITY/COUNTY COMMISSIONERS SO THEY DO NOTHING!	Social Media (Facebook, Twitter, Instagram, etc); Friends, family, word of mouth;TV;Radio;Newspaper;Websites - local government pages;Text messages;Emergency alert subscriptions;	Don't depend on local council members to protect the citizens!!!
150			TV;Radio;Social Media (Facebook, Twitter, Instagram, etc);Emergency alert subscriptions;	
151		MHA Nation- meet with them for EAP collaboration.	Social Media (Facebook, Twitter, Instagram, etc);Text messages;	
152	None	Tribal and very small town	Radio;Websites - local government pages;Social Media (Facebook, Twitter, Instagram, etc);Emergency alert subscriptions;	No
153	Do not currently own a home, so no plans other than our purchased renters insurance.	No	Friends, family, word of mouth;Text messages;	No
154	For winter storms, keep up with snow removal, esp. on the roof.	work with groups that engage with people from another country. especially, those countries that never experience winter/snow.	TV;Social Media (Facebook, Twitter, Instagram, etc);Emergency alert subscriptions;Radio;	
155	Added drain tile. Have a working generator. Stockpile food/ water	All of them.	TV;Radio;Websites - local government pages;Text messages;Emergency alert subscriptions;	No
156			TV;Social Media (Facebook, Twitter, Instagram, etc);Emergency alert subscriptions;Text messages;	
157			Friends, family, word of mouth;TV;Radio;Websites - local government pages;Social Media (Facebook, Twitter, Instagram, etc);	
158	None	No	Friends, family, word of mouth;	No
159		Mental health and addiction counseling services need to be much more widely available.	Friends, family, word of mouth;Radio;Social Media (Facebook, Twitter, Instagram, etc);Text messages;Emergency alert subscriptions;	
160			TV; Friends, family, word of mouth;Social Media (Facebook, Twitter, Instagram, etc);	
161			Radio;Text messages;	
162	Do the best I can.	None	Friends, family, word of mouth;Radio;Newspaper;Websites - local government pages;Social Media (Facebook, Twitter, Instagram, etc);Emergency alert subscriptions;Text messages;	
163			Friends, family, word of mouth;Social Media (Facebook, Twitter, Instagram, etc);Text messages;	
164				
165	Readiness measures	Talk to them. Hold free conference at accessible places and times.	Friends, family, word of mouth;	

ID	What additional actions do you plan to take to reduce the risk to your home or business from natural hazards (example: floods, earthquakes, winter storms)?	Do you have any suggestions for how the state can engage with more diverse and under-represented groups and individuals? Are there any specific groups you think the state should engage with?	How do you normally get information about a disaster in your area?	Are there any other comments or stories you would like to share with us about hazards?
166	Our home is as prepared as it can be. We have a small generator that could run a heater and/or sump pump. After purchasing our home we improved our sump pump situation by making the reservoir larger and adding a second pump and reservoir on the opposite end of our basement from the first one. Beyond that, there's nothing else that we can really do.	Letting every single person that lives here know what to do in the event of certain emergencies should be a top priority. Nobody knows what they're actually supposed to do. I don't believe that the individuals in our community involved in emergency response would be able to tell anyone either.	Friends, family, word of mouth;Websites - local government pages;Social Media (Facebook, Twitter, Instagram, etc);Text messages;Emergency alert subscriptions;Radio;TV;	
167	Informed knowledge about water risk to my home--previous flooding issues in the neighborhood, sump pump, etc.,		Websites - local government pages;Social Media (Facebook, Twitter, Instagram, etc);Text messages;Emergency alert subscriptions;	I'm more concerned about infrastructure maintenance and upkeep than I am about new infrastructure (that we will then have to maintain and upkeep). If flood (or other) protection cannot be maintained, other mitigation tactics such as emergency insurance, etc., should be the course from a sustainability perspective. This needs to be broadly communicated at all levels.
168	Install board and batton sidding and impact resistant shingles when financing is available.	No	Friends, family, word of mouth;TV;Social Media (Facebook, Twitter, Instagram, etc);Emergency alert subscriptions;	No
169			TV;Radio;Social Media (Facebook, Twitter, Instagram, etc);Emergency alert subscriptions;	
170			Websites - local government pages;Social Media (Facebook, Twitter, Instagram, etc);Emergency alert subscriptions;	
171	I would love to build a storm shelter as we live in a slab house with no basement.		TV;Radio;Websites - local government pages;Websites - private;Social Media (Facebook, Twitter, Instagram, etc);Text messages;Emergency alert subscriptions;	
172			Websites - local government pages;Emergency alert subscriptions;	
173	Generators		Social Media (Facebook, Twitter, Instagram, etc);Emergency alert subscriptions;	
174			Text messages;Emergency alert subscriptions; Friends, family, word of mouth;	
175			Emergency alert subscriptions; Friends, family, word of mouth;	
176			Friends, family, word of mouth;TV;Social Media (Facebook, Twitter, Instagram, etc);Text messages;Emergency alert subscriptions;	
177			Social Media (Facebook, Twitter, Instagram, etc);Text messages;	
178			Friends, family, word of mouth;TV;Radio;Social Media (Facebook, Twitter, Instagram, etc);Text messages;	
179			TV;Websites - private;Social Media (Facebook, Twitter, Instagram, etc);Text messages;Emergency alert subscriptions;	
180			Websites - local government pages;Websites - private;Social Media (Facebook, Twitter, Instagram, etc);Text messages;Emergency alert subscriptions;	
181			Social Media (Facebook, Twitter, Instagram, etc);TV;Radio;	
182			TV;Websites - local government pages;	
183			TV;Radio; Friends, family, word of mouth;Text messages;	
184	I hold regular Emergency Drills at Knife River Care Center	Medical, assisted and skilled living facilities	TV;Radio;Social Media (Facebook, Twitter, Instagram, etc);Text messages;	not sure
185	Generators	Rural elderly	Radio;TV;Websites - local government pages;Social Media (Facebook, Twitter, Instagram, etc);	
186	Will seal up doors better before winter.		Social Media (Facebook, Twitter, Instagram, etc); Friends, family, word of mouth;	
187			Social Media (Facebook, Twitter, Instagram, etc);	
188	None at this time		Radio; Friends, family, word of mouth;Social Media (Facebook, Twitter, Instagram, etc);Emergency alert subscriptions;	
189			Friends, family, word of mouth;TV;Social Media (Facebook, Twitter, Instagram, etc);Emergency alert subscriptions;	
190	stockpile food and water	NA	TV;Websites - local government pages;Websites - private;Social Media (Facebook, Twitter, Instagram, etc);Text messages;Emergency alert subscriptions;	NA

ID	What additional actions do you plan to take to reduce the risk to your home or business from natural hazards (example: floods, earthquakes, winter storms)?	Do you have any suggestions for how the state can engage with more diverse and under-represented groups and individuals? Are there any specific groups you think the state should engage with?	How do you normally get information about a disaster in your area?	Are there any other comments or stories you would like to share with us about hazards?
191	Education, prepairedness	More posting with social media	Social Media (Facebook, Twitter, Instagram, etc);	
192			Friends, family, word of mouth;TV;Radio;Newspaper;Websites - local government pages;Websites - private;Social Media (Facebook, Twitter, Instagram, etc);Text messages;Emergency alert subscriptions;	
193			TV;Radio;	
194			Friends, family, word of mouth;	
195		Provide better funding for emergency services- fire emt police etc. yes they may be funded by the cities but they could receive funding from the state for training or to enhance their ability to protect and serve our communities expanders their abilities Bismarck fire should have water rescue squad/ capabilities	Friends, family, word of mouth;Websites - local government pages;Websites - private;Social Media (Facebook, Twitter, Instagram, etc);	
196			Friends, family, word of mouth;Websites - local government pages;Emergency alert subscriptions;	
197	Continue to live on high ground!		Radio;Newspaper;Websites - local government pages;Social Media (Facebook, Twitter, Instagram, etc);Text messages;Emergency alert subscriptions;	
198	nope	nope	Friends, family, word of mouth;TV;Radio;Websites - local government pages;Social Media (Facebook, Twitter, Instagram, etc);	
199	Service alerts	Text alerts	TV;Radio; Friends, family, word of mouth;Text messages;Social Media (Facebook, Twitter, Instagram, etc);	None
200	Leave Bismarck		TV;Emergency alert subscriptions;	
201	Get good roofing	Make emergency alerts mandatory.	Radio;Text messages;Emergency alert subscriptions;	
202			Friends, family, word of mouth;	
203			Emergency alert subscriptions;	
204	Installed a steel roof instead of asphalt shingles for durability and longevity. We redid the landscaping around the house to prevent flood damage. The house is wired to run off a portable generator if needed.	Simple, visit the small towns in each county. Invite community stakeholders to the table for a discussion and find out what is needed. Not all needs will be the same but I'm sure there will be an emerging trend. The large hub cities don't need all the emergency money, they have the ability to create their own revenue streams, small towns do not!	Emergency alert subscriptions;Text messages;Social Media (Facebook, Twitter, Instagram, etc); Friends, family, word of mouth;	Please help not only Flasher, but all small communities. Especially those with a population under 500 people. We seem to consistently fall though the cracks. Generators, emergency shelters, new or better equipment and new emergency warning systems are vital to our safety.
205	Getting a more accessible place to store my snow blower so I am able to get to it to clear the snow easier.	Our community needs emergency shelter area for our residents, generators to keep our city running in case of an emergency, and we need to update our emergency siren system.	Radio;Social Media (Facebook, Twitter, Instagram, etc);Emergency alert subscriptions;	Our city is a small community with a lot of elderly and retired people; we do not have a lot of money to help out in the community. The city commission does what they can, but they do not have the funds to do all the things that really need to be done to keep our community as safe as is possible.
206			Friends, family, word of mouth;Social Media (Facebook, Twitter, Instagram, etc);Emergency alert subscriptions;	
207			Friends, family, word of mouth;TV;Websites - local government pages;Social Media (Facebook, Twitter, Instagram, etc);Text messages;Emergency alert subscriptions;	
208			Friends, family, word of mouth;TV;Radio;Websites - local government pages;Social Media (Facebook, Twitter, Instagram, etc);	
209			TV;Emergency alert subscriptions;Text messages;Radio; Friends, family, word of mouth;	
210	Be constantly aware of the weather		Websites - private;Websites - local government pages;Social Media (Facebook, Twitter, Instagram, etc);Text messages; Friends, family, word of mouth;	
211	Keep food on hand		Emergency alert subscriptions;Text messages;	
212	Awareness of real threats vs fabricated worries			
213			Social Media (Facebook, Twitter, Instagram, etc);	
214			TV;Websites - local government pages;	
215		Remember the reservations, we are still here	Websites - local government pages;	

ID	What additional actions do you plan to take to reduce the risk to your home or business from natural hazards (example: floods, earthquakes, winter storms)?	Do you have any suggestions for how the state can engage with more diverse and under-represented groups and individuals? Are there any specific groups you think the state should engage with?	How do you normally get information about a disaster in your area?	Are there any other comments or stories you would like to share with us about hazards?
216			Radio;TV;Social Media (Facebook, Twitter, Instagram, etc);	
217	Adding the right materials to home.	Provide funds for repairs.	Cybercon ;	
218			Friends, family, word of mouth;Text messages;Emergency alert subscriptions;	
219			Friends, family, word of mouth;Social Media (Facebook, Twitter, Instagram, etc);Emergency alert subscriptions;	
220	Plan to get a whole house generator that runs off of natural gas/propane		Friends, family, word of mouth;TV;Text messages;Emergency alert subscriptions;	
221			TV; Friends, family, word of mouth;Social Media (Facebook, Twitter, Instagram, etc);Emergency alert subscriptions;	
222	Generators, sandbags, Gasoline	More support with elders and helping them in hard situations	Emergency alert subscriptions;Radio;TV; Friends, family, word of mouth;Text messages;	
223	Redundant heat and electricity sources. Camper for moveable shelter	Go meet them where they are with a key community member's support. Tribal partners	Websites - private;Websites - local government pages;Social Media (Facebook, Twitter, Instagram, etc);Emergency alert subscriptions;	
224	Make general repairs and both minor and major renovations to make the house better able to withstand extreme heat/cold.	If schools are amenable, work with schools to disburse the information via students; work with nonprofits/organizations that work with specialized groups. I realize these efforts take A LOT of work.	Radio;Social Media (Facebook, Twitter, Instagram, etc);	
225		Requirements for exercise/practice in facilities. More outreach to homebound to help them create a plan.	TV;Websites - local government pages;Social Media (Facebook, Twitter, Instagram, etc);Text messages;Emergency alert subscriptions;	
226			Friends, family, word of mouth;Radio;TV;Websites - local government pages;Social Media (Facebook, Twitter, Instagram, etc);Text messages;	
227		Go into the schools & teach good planning & prep.	Social Media (Facebook, Twitter, Instagram, etc);Text messages;Emergency alert subscriptions; Friends, family, word of mouth;Websites - local government pages;	
228	Bought a house on a hill so it doesn't flood. Be prepared for winter. Rare chance of earthquakes here.		Friends, family, word of mouth;Social Media (Facebook, Twitter, Instagram, etc);Websites - private;	
229			TV; Friends, family, word of mouth;Radio;Social Media (Facebook, Twitter, Instagram, etc);	
230			Websites - local government pages; Friends, family, word of mouth;TV;Radio;Text messages;	
231			TV;Radio; Friends, family, word of mouth;Websites - local government pages;	
232		Elderly population to ensure they stay up to date. Also kids under the age 18, they are our future reach out to juniors & seniors in HS & get their ideas and perspective.	Websites - private;Social Media (Facebook, Twitter, Instagram, etc);TV;	
233	made a choice not to live in a flood zone and have plenty of snow mitigation equipment		Friends, family, word of mouth;TV;Radio;Websites - local government pages;Websites - private;Social Media (Facebook, Twitter, Instagram, etc);Text messages;Emergency alert subscriptions;	no
234	Referring to wildlife item Hettinger has an ever increasing herd of deer who go wherever they please including jumping our garden fence.		Social Media (Facebook, Twitter, Instagram, etc);Emergency alert subscriptions;TV;	
235			Social Media (Facebook, Twitter, Instagram, etc);Websites - private;Websites - local government pages;TV; Friends, family, word of mouth;Emergency alert subscriptions;Text messages;	
236		Help Stark County to purchase additional sirens to have better coverage in the expanding development in the county	Text messages; Friends, family, word of mouth;TV;Radio;Reverse 911 call;	
237	Monitor the weather		Friends, family, word of mouth;Websites - local government pages;Text messages;	
238	Our house is in a good location and is relatively protected from floods and storms.	No	TV;Radio;Social Media (Facebook, Twitter, Instagram, etc);Text messages;	No
239	Have surplus of supplies. Fuel, food, emergency kits		TV;Websites - local government pages;	
240			Social Media (Facebook, Twitter, Instagram, etc);	Have local fire department, ambulance and law enforcement agencies develop better relationships with each other and quit trying to one up each other. Trust needs to be establish and let each person do their job.
241			Friends, family, word of mouth;Emergency alert subscriptions;Websites - local government pages;Social Media (Facebook, Twitter, Instagram, etc);Radio;TV;	
242	Try and keep the driveway clear, keep snow pushed away from home	Not at the moment, but there is always room for improvement	TV; Friends, family, word of mouth;Social Media (Facebook, Twitter, Instagram, etc);	No

ID	What additional actions do you plan to take to reduce the risk to your home or business from natural hazards (example: floods, earthquakes, winter storms)?	Do you have any suggestions for how the state can engage with more diverse and under-represented groups and individuals? Are there any specific groups you think the state should engage with?	How do you normally get information about a disaster in your area?	Are there any other comments or stories you would like to share with us about hazards?
243	Try and stock up on needed medications, always plan ahead of any major storms, stay at home during storms and clean ups after storm.	Engage people with disabilities, rural residents, and township supervisors who should be regular invitees to all meetings, planning, and on any boards. Send minutes to them to keep them aware, encourage attendance, and seek their involvement. Post all minutes and planning issues on easily accessed websites ... involve your community. STATE and County and City officials should respect their public health employees and recommendations and stop turning public health into a political issue.	TV;Social Media (Facebook, Twitter, Instagram, etc);Websites - private;	
244	I have purchased a generator		Websites - local government pages;Social Media (Facebook, Twitter, Instagram, etc);Radio;TV;	I live 4 miles from a very lg oil tank farm and would like to know what precautions have been in place in case of an explosion.
245			Friends, family, word of mouth;Radio;Websites - local government pages;Social Media (Facebook, Twitter, Instagram, etc);Text messages;Emergency alert subscriptions;	Ice on powerlines & other electrical problems causing power outages... shout out to all ND Linemen! They do great work for us all during some of the WORST conditions & we should really be making sure that they 100% have the best work gear & tools possible. Frost protection for them as like Firemen have heat protection.
246			Friends, family, word of mouth;TV;Radio;Websites - local government pages;Social Media (Facebook, Twitter, Instagram, etc);Text messages;	
247	Generator	Residents who had 10000 barrel tanks full of flammable- explosive built less than 1/2 mile of there Residents. Industrial hazard H2s gas leaks	Friends, family, word of mouth;	H2s is a deadly chemical gas that should be taken far more seriously, I've know people who have died from it, but people here think it's a joke, it should be smell gas call 911
248	Plenty of ammo	Yeah stay out of peoples lives government is WAY TOO BIG	I see the writing in the clouds when the jets fly over spreading garbage spray so it's all the news I need. It says government is trying to kill everyone for 1 world order.;	Carbon capture nut jobs, climate change is fake made up just to get rich off it. The cloud seeding needs to stop
249	Nothing I rent	Anyone who lives by the river	Friends, family, word of mouth;TV;Text messages;Websites - local government pages;	
250			Radio;Text messages;	
251	Be safe	There is a lack of respect for people who are worried about the natural environment here &/or are not white republicans. We are so polarized here in North Dakota! Start by being nice!	Websites - local government pages;Radio;	
252		Monitor rail and oil industry closer.	Websites - local government pages;Radio;TV;	
253	Divest from fossil fuel financing, actively work to end fossil fuel use on this nation. Invest in green energy and technology that reduces greenhouse gases. Protest and demand action from legislators.	Actively engage with indigenous nations and learn from them how to live in harmony with our environment.	TV;Radio;Websites - local government pages;Emergency alert subscriptions;Social Media (Facebook, Twitter, Instagram, etc);Websites - private;	
254	Whole house generator	Ask the people of this state how weather modification has affected them in the last 10 years or so. We should be allowed to vote on this if it affects our property, livelihood, and of course the modification of weather that we should leave alone!	TV; Friends, family, word of mouth;Websites - local government pages;Social Media (Facebook, Twitter, Instagram, etc);Emergency alert subscriptions;	Stop weather modification in North Dakota
255	Solar panels and onsite storage among with an electric vehicle to mitigate road closure impacts causing fuel shortages or even runs on fuel before potential weather events.		Friends, family, word of mouth;Websites - local government pages;Social Media (Facebook, Twitter, Instagram, etc);Text messages;Emergency alert subscriptions;	
256		Put all the tweakers in treatment and the criminals behind bars. It's destroying communities and nobody cares.	Social Media (Facebook, Twitter, Instagram, etc);TV;Radio;	
257			TV; Friends, family, word of mouth;Radio;Newspaper;Emergency alert subscriptions;Text messages;	
258			TV;Social Media (Facebook, Twitter, Instagram, etc);Text messages;	
259		Be more involved in the community, face to face, not only in ads and campaigns, and engage with all groups.	Radio;Websites - local government pages;Social Media (Facebook, Twitter, Instagram, etc);	
260		Use the NextDoor app to promote emergency preparedness and mitigation. Meet with Mothers Groups such as MOMS Club of Bismarck.	Friends, family, word of mouth;TV;Radio;Text messages;Social Media (Facebook, Twitter, Instagram, etc);	
261			Friends, family, word of mouth; TV; Radio; Social Media (Facebook, Twitter, Instagram, etc); Text messages; Emergency alert subscriptions	

ID	What additional actions do you plan to take to reduce the risk to your home or business from natural hazards (example: floods, earthquakes, winter storms)?	Do you have any suggestions for how the state can engage with more diverse and under-represented groups and individuals? Are there any specific groups you think the state should engage with?	How do you normally get information about a disaster in your area?	Are there any other comments or stories you would like to share with us about hazards?
262	Add a generator (if prices go down)	Direct outreach to groups that assist those with functional access needs.	Friends, family, word of mouth; TV; Radio; Social Media (Facebook, Twitter, Instagram, etc); Text messages; Emergency alert subscriptions	
263		Use representatives from diverse and under represented groups and individuals to provide messaging	Friends, family, word of mouth; TV; Radio; Social Media (Facebook, Twitter, Instagram, etc); Emergency alert subscriptions	
264	Not many options left	Work through social services to make contact with under-represented groups via phone apps. Everyone has a phone.	TV; Radio; Websites - local government pages; Social Media (Facebook, Twitter, Instagram, etc); Emergeny alert subscriptions	Many improvements have been made through the years (notifications, hazard mitigation, critical infrastructure, etc.) continue the process and try to improve (newer methods, changing times, etc.).

B.5.3 Public Survey Publicity and Notice

From: Adair, Celinda

To: hopebrighton; Jensen, Eric

Cc: Donahue, Kathleen B.; Walton, Margaret M; Allemang, Heather; Burke, Alexander **Subject:** RE: NDDES Enhanced Mitigation MAOP - Public survey social media ads are live **Date:** Monday, August 21, 2023 9:21:00 AM

Attachments:

image 008.png
image 009.png
image 010.png
image 011.jpg
image 012.png
image 013.png
image 014.png
image 015.png
image 016.png

Public Survey Ad 1 posting.png Public Survey Ad 2 posting.png road_1.PNG

road_2.PNG
collage.PNG
river.PNG
collage_1.PNG

Hi there,
The Social Media ads were posted Friday afternoon to capture views Friday night and over the weekend when people are most frequently on social media. I've attached pictures of the ads. They have gotten some attention. They were posted to the ND Hazards Facebook and Instagram pages that we created. If you search for ND Hazards they will show up on both Social Media platforms. The ads can be shared. Eric, please let us know if you have any trouble sharing them to your official NDDES page. Also, please let us know when you have shared them as we will post that to help verify that these are NDDES sponsored surveys.

Here is the link to the Facebook page: https://www.facebook.com/profile.php?id=61550057018766

The ads will run for 7 days for this first trial run. Below are the details for the locations and age groups targeted.

We have allowed comments on the ads (although we have put controls on so that profanity, images, videos, and links cannot be posted). We are moderating the comments to ensure nothing inappropriate is posted. Most seem to be political, some are negative, but not inappropriate. A few are hazard related.
We can adopt a policy of hiding all comments as they come in if you'd prefer and post a note in the comments asking people to provide their comments in the survey. **Please let us know if you'd like us to do so.**

I've attached screen shots of the comments received to date, for your reference.

We are tracking the survey results. Pre-advertisement we had 41 survey respondents. Currently we have 63 responses. We will continue to monitor the responses throughout the week and will report out at the end of this 1 week trial ad-run.

Kind regards,

Celinda

Celinda Adair (she/her) CFM
Senior Planner I

Engineering Services

SNC-Lavalin/Atkins

20700 44th Ave West, Suite 130 | Lynnwood | Washington | 98036 | USA

At SNC-Lavalin, we work flexible hours around the world. Although I have sent this email at a time convenient for me, I don't expect you to respond until it works for you.

From: Leitch, Katie <katieleitch@nd.gov>
Sent: Thursday, July 6, 2023 10:08 AM
To: NDDES-EM <nddes-em@nd.gov>; -Grp-NDDES All Personnel <demail@nd.gov>
Cc: Brighton, Hope <hopebrighton@nd.gov>; Donahue, Kathleen B. <kdonahue@nd.gov>
Subject: ND State Enhanced Mitigation Plan Survey

Local & Tribal Staff Survey for ND State Enhanced Mitigation Plan

Public Survey for ND State Enhanced Mitigation Plan

Good morning,

As many are aware, we are currently going through the process of updating our ND State Enhanced Mitigation Plan. We value your input as it drives our planning efforts and plan information. Please take a moment to scan the attached QR code(s) and/or see below links to share with us your thoughts about hazards and risks experienced throughout communities. Please share the survey as you see fit, as we are looking for whole community input. If you have any questions, please refer to Hope Brighton (hopebrighton@nd.gov) or Kathleen Donahue (kdonahue@nd.gov).

Local and tribal staff :
https://forms.office.com/Pages/ResponsePage.aspx?id=DwvXh_yekUmgZelFyD2zCir9v0TNoholsGsXK3Y479xUOFoaT0tNMUKWEEx5DcwRVlQMFMuvV0kwVI4u&origin=QRCode

Public:
https://forms.office.com/Pages/ResponsePage.aspx?id=DwvXh_yekUmgZelFyD2zCir9v0TNoholsGsXK3Y479xUMTVlRktDQ0IORDkzODNQTDVTRVBOQlU3OS4u&origin=QRCode

Thank you for your continued support to enhance our states resiliency!

Katie L. Leitch
Planning Specialist
Division of Homeland Security

701.328.8121 | 218.731.1715 (m) | katieleitch@nd.gov | www.des.nd.gov | www.ndresponse.gov

NORTH Dakota | Emergency Services

TAKE OUR SURVEY

SCAN ME!

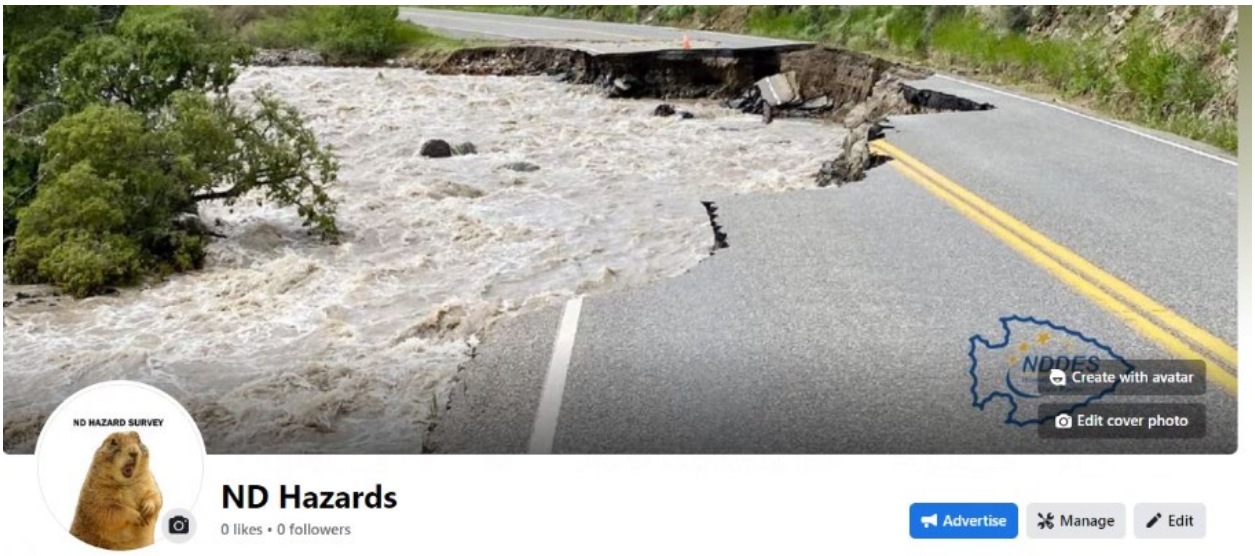
WHAT HAZARDS AFFECT *YOUR* COMMUNITY?

https//bit.ly/3NQeost

Collaborating with our communities to understand hazards and risks helps with creating and implementing the North Dakota Enhanced Mitigation Plan. We want to know what concerns you, whether it's flooding, wildfires or severe summer or winter storms. Consider taking a few moments to share your thoughts on hazard risk in your community and providing answers to a short survey.

NDDES
Homeland Security
State Radio

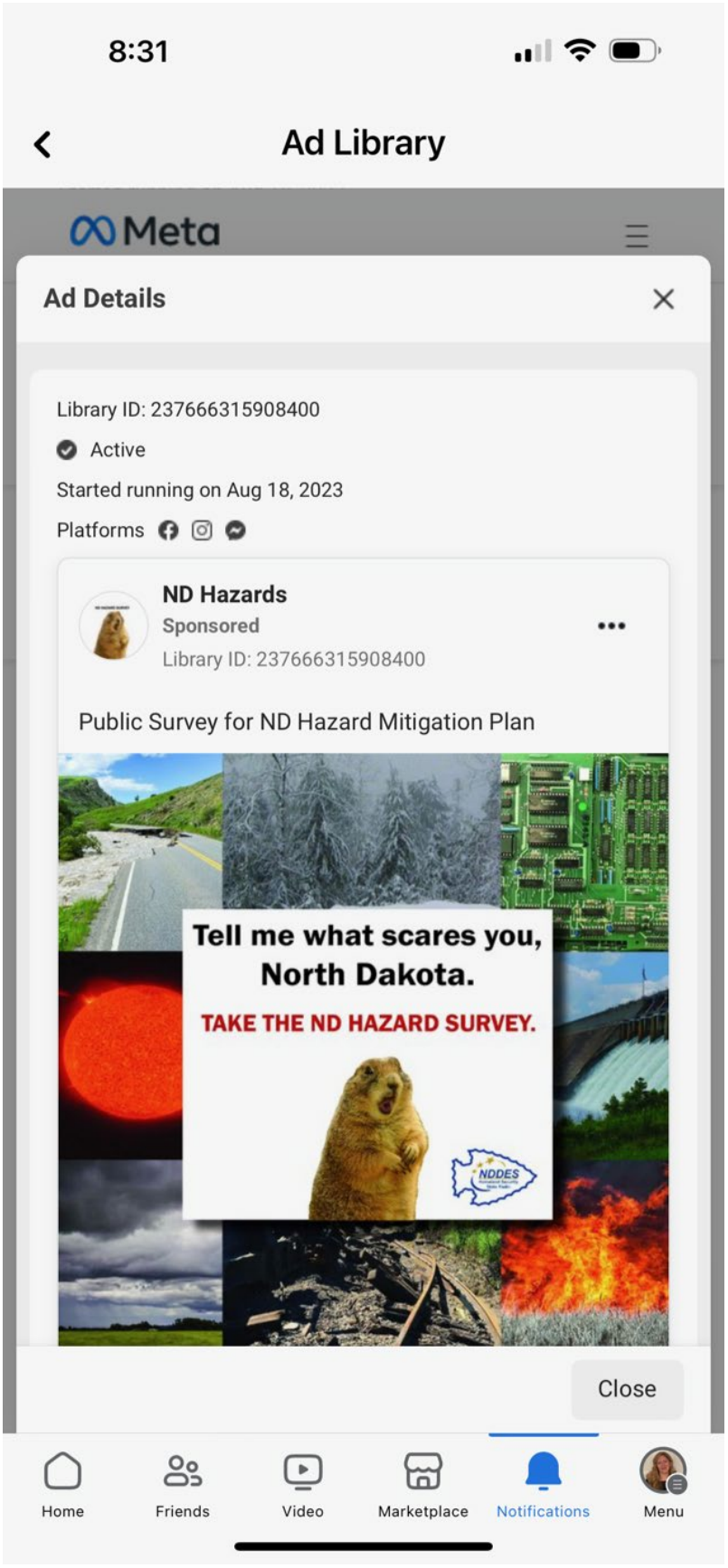
des.nd.gov • www.facebook.com/ndemergencyservices

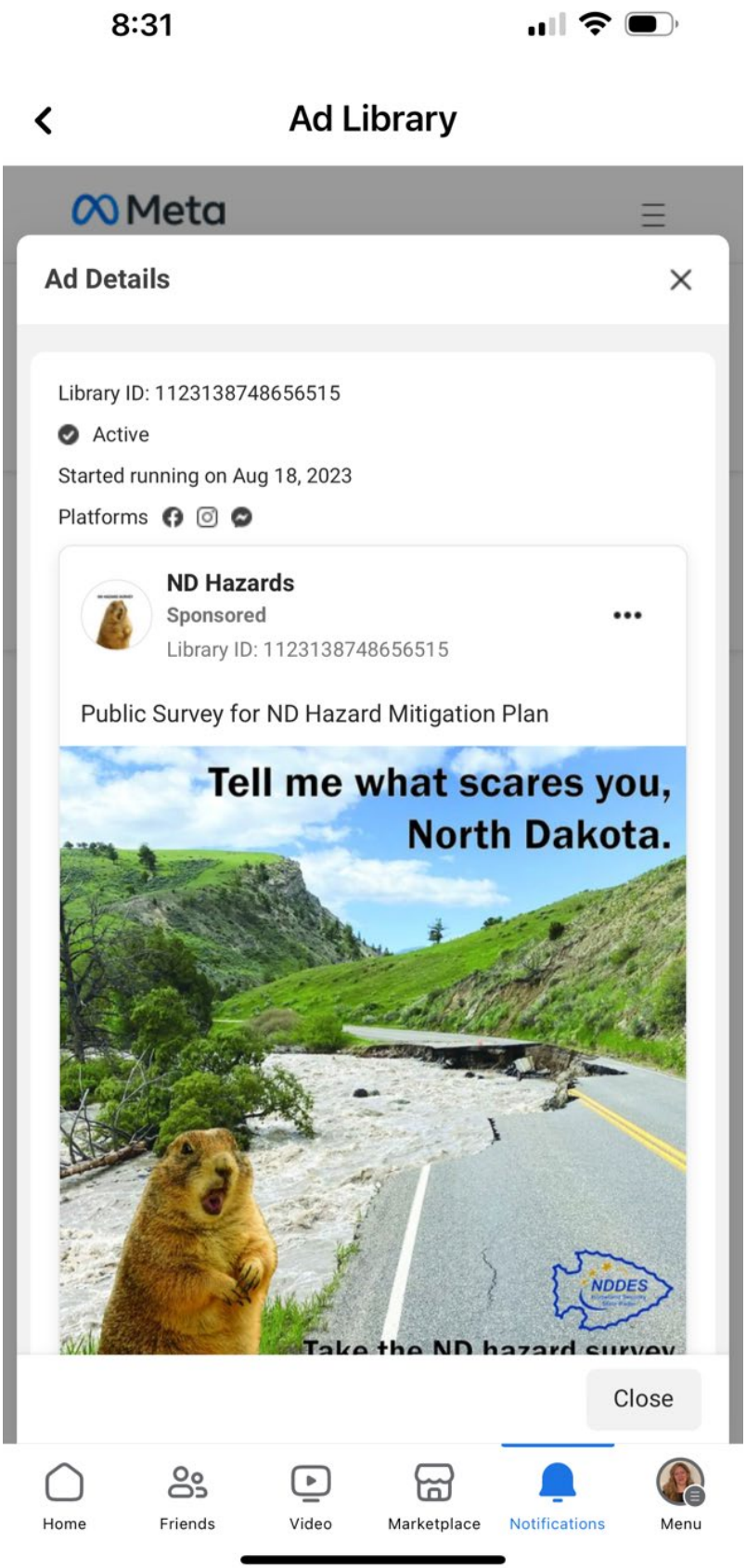


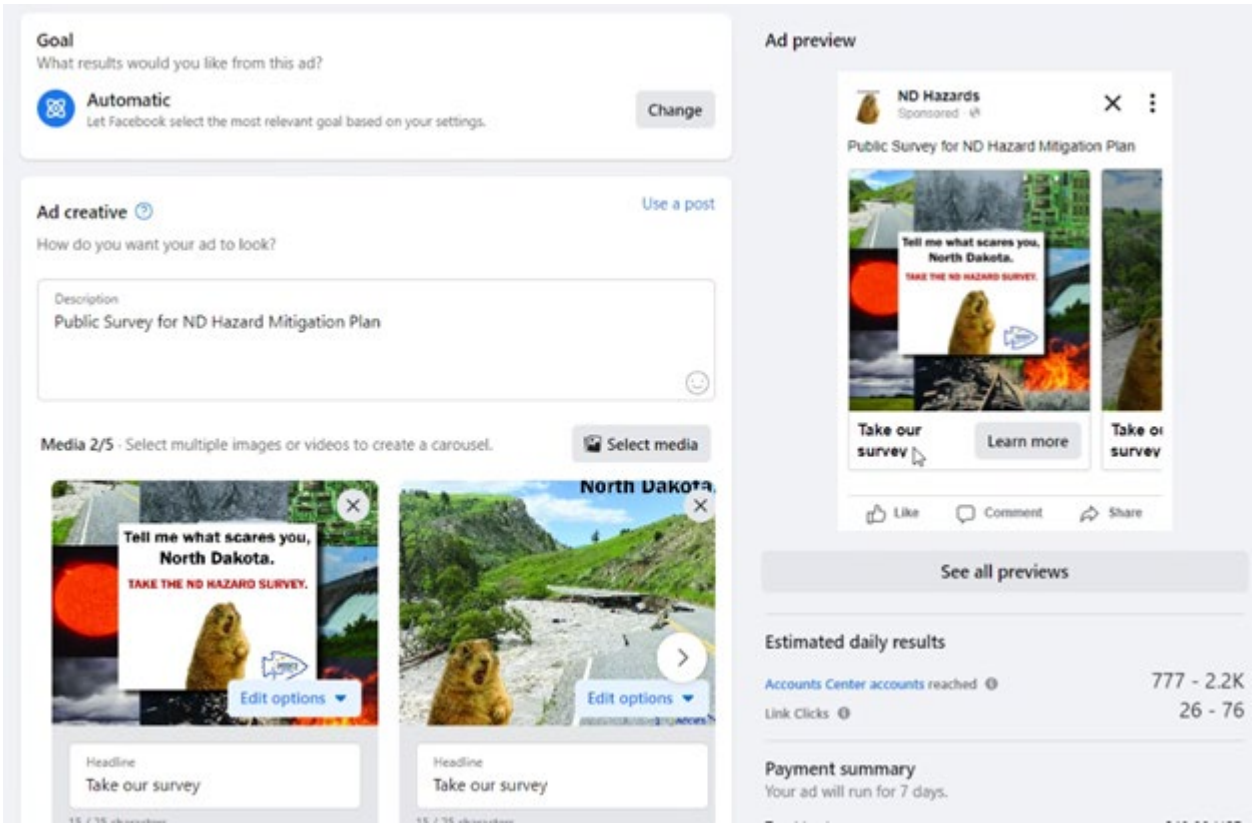
ND Hazards

0 likes • 0 followers

Advertise | Manage | Edit


8:31
Ad Library
Meta
Ad Details
Library ID: 237666315908400
Active
Started running on Aug 18, 2023
Platforms
ND Hazards
Sponsored
Library ID: 237666315908400
Public Survey for ND Hazard Mitigation Plan
Tell me what scares you, North Dakota.
TAKE THE ND HAZARD SURVEY.
NDDES
Close
Home
Friends
Video
Marketplace
Notifications
Menu


8:31
Ad Library
Meta
Ad Details
Library ID: 1123138748656515
Active
Started running on Aug 18, 2023
Platforms
ND Hazards
Sponsored
Library ID: 1123138748656515
Public Survey for ND Hazard Mitigation Plan
Tell me what scares you, North Dakota.
NDDES
Take the ND hazard survey
Close
Home
Friends
Video
Marketplace
Notifications
Menu


Goal
What results would you like from this ad?
Automatic
Let Facebook select the most relevant goal based on your settings.
Change
Ad creative
Use a post
How do you want your ad to look?
Description
Public Survey for ND Hazard Mitigation Plan
Media 2/5 · Select multiple images or videos to create a carousel.
Select media
Tell me what scares you, North Dakota.
TAKE THE ND HAZARD SURVEY.
Edit options
Headline
Take our survey
North Dakota
Edit options
Headline
Take our survey
Ad preview
ND Hazards
Sponsored
Public Survey for ND Hazard Mitigation Plan
Tell me what scares you, North Dakota.
TAKE THE ND HAZARD SURVEY.
Take our survey
Learn more
Like
Comment
Share
See all previews
Estimated daily results
Accounts Center accounts reached
777 - 2.2K
Link Clicks
26 - 76
Payment summary
Your ad will run for 7 days.

Public Survey for ND State Enhanced Mitigation Plan

Local & Tribal Staff Survey for ND State Enhanced Mitigation Plan

Thank you in advance for your input. This short survey has 4 sections and should take you between 5-10 minutes to complete.

Community Hazards and Priorities

1. Community Name: What community do you work for or represent?

2. Please select the top 4 hazards you think are the biggest threat to your community:

Please select at most 4 options.

- [ ] Dam Failure
- [ ] Drought
- [ ] Earthquake
- [ ] Extreme Heat
- [ ] Extreme Winter Storm Events
- [ ] Flood
- [ ] Hail
- [ ] Hazardous Material Event
- [ ] Landslide
- [ ] Tornado
- [ ] Transportation Disaster (Road or Rail Crash)
- [ ] Wildfire
- [ ] Windstorm / High Wind Events
- [ ] Other

3. What other hazard(s) not listed above should be considered?

4. If you have any examples of a recent mitigation actions which successfully reduced risk in your community, please share them below. Otherwise leave blank.

5. What challenges or obstacles do you face when developing or performing mitigation actions in your community?

Community Engagement & Public Outreach

6. How do you most successfully conduct outreach & share hazard information with your community members? (Select your top 3)

Please select at most 3 options.

- [ ] Mailers / flyers / newsletters
- [ ] Press release
- [ ] Newspaper notice
- [ ] Public meetings
- [ ] Public event tables (ex: a County Fair booth)
- [ ] TV / radio ads
- [ ] Social media
- [ ] Website
- [ ] Word of mouth
- [ ] Other

7. If you have any examples of innovative outreach or engagement strategies that were successful in encouraging public participation, please share them below. Otherwise leave blank.

8. Share your best practices and suggestions for engaging under-represented groups: Who would you like to connect with regarding disasters? What works well for you? Or, what do you struggle with?

Connecting Community and State Data & Actions

9. Does your community use data or mitigation actions from the State enhanced mitigation plan in its local plans, policies, regulations, or outreach? Please share where and how the information and actions from the State plan are integrated into your community efforts.

	Hazard Risk Data/Info	Mitigation Actions
Local Policies	○	○
Local Regulations	○	○
Local Outreach Materials	○	○
Local Planning/ Strategy Documents	○	○
Other (describe below)	○	○

10. If you selected "Other" above, please describe.

11. Can you give an example of how you integrated State plan data/actions? What State data or actions were the most valuable to you?

Your Training and Information Needs

12. What support from the State would help you most in mitigating the hazards in your community?
(Ex: outreach tools or materials, specific hazard risk data, mitigation action ideas, grant funding information, engineering/technical review of proposed actions, etc.)

13. Have you participated in, or plan to participate in, committee or other meetings related to the State plan update?
(Note: If you are interested in participating, the last question in this survey has space to add your contact info)

- ◯ Yes, already participating
- ◯ Not yet but I plan to
- ◯ Maybe (not sure)
- ◯ No, not participating

14. The State plan is anticipated to be released late 2023 or early 2024. Are you interested in reviewing and providing feedback?

- ◯ Yes
- ◯ Maybe
- ◯ No

15. If you'd like to receive email updates about the plan drafts and progress, or participate in committees or other plan development activities, please enter your contact information below.

Contact

If you have questions regarding this survey, or would like more information about the State of North Dakota's
enhanced mitigation plan update, please contact Hope Brighton at hopebrighton@nd.gov.
Please click SUBMIT to complete the survey - Thank you for your participation.

Local & Tribal Staff Survey for ND State Enhanced Mitigation Plan

24	15:06	Closed
Responses	Average time to complete	Status

1. Community Name: What community do you work for or represent?

More Details Insights

24
Responses

Latest Responses
"LaMoure County"
"LaMoure"
"Foster County"

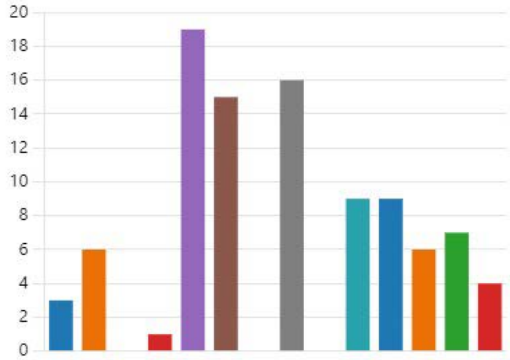
...

19 respondents (**79**%) answered **County** for this question.

2. Please select the top 4 hazards you think are the biggest threat to your community:

More Details

Dam Failure	3
Drought	6
Earthquake	0
Extreme Heat	1
Extreme Winter Storm Events	19
Flood	15
Hail	0
Hazardous Material Event	16
Landslide	0
Tornado	9
Transportation Disaster (Road or...	9
Wildfire	6
Windstorm / High Wind Events	7
Other	4



3. What other hazard(s) not listed above should be considered?

More Details Insights

13
Responses

Latest Responses
"Power Grid Failure"
"Covid"

2 respondents (**15**%) answered **natural hazard** for this question.

4. If you have any examples of a recent mitigation actions which successfully reduced risk in your community, please share them below. Otherwise leave blank.

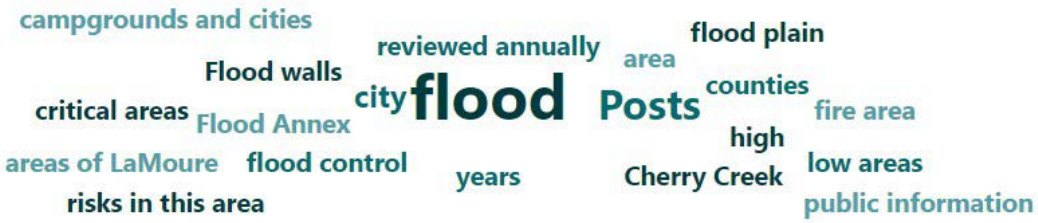
More Details Insights

14
Responses

Latest Responses
"Dikes at low areas of LaMoure to prevent flooding of James River into com..."

...

6 respondents (**43**%) answered **flood** for this question.



5. What challenges or obstacles do you face when developing or performing mitigation actions in your community?

More Details Insights

20
Responses

Latest Responses
"lack of snow storm resources for responding to emergencies"

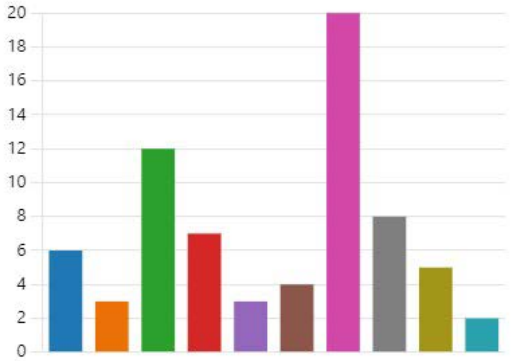
...

5 respondents (**25**%) answered **community** for this question.

6. How do you most successfully conduct outreach & share hazard information with your community members? (Select your top 3)

More Details

Mailers / flyers / newsletters	6
Press release	3
Newspaper notice	12
Public meetings	7
Public event tables (ex: a County...	3
TV / radio ads	4
Social media	20
Website	8
Word of mouth	5
Other	2



7. If you have any examples of innovative outreach or engagement strategies that were successful in encouraging public participation, please share them below. Otherwise leave blank.

More Details Insights

9
Responses

Latest Responses

3 respondents (**33**%) answered **people** for this question.

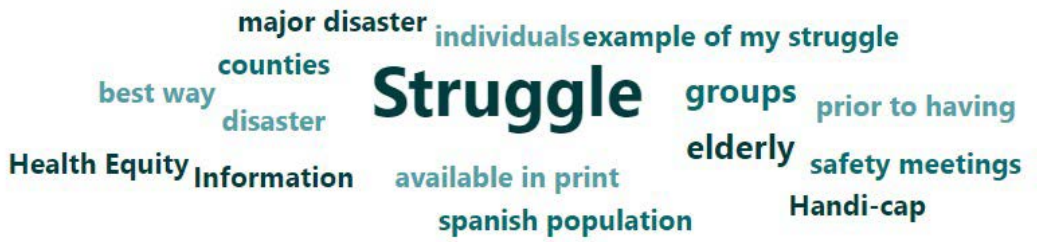
8. Share your best practices and suggestions for engaging under-represented groups: Who would you like to connect with regarding disasters? What works well for you? Or, what do you struggle with?

More Details Insights

13
Responses

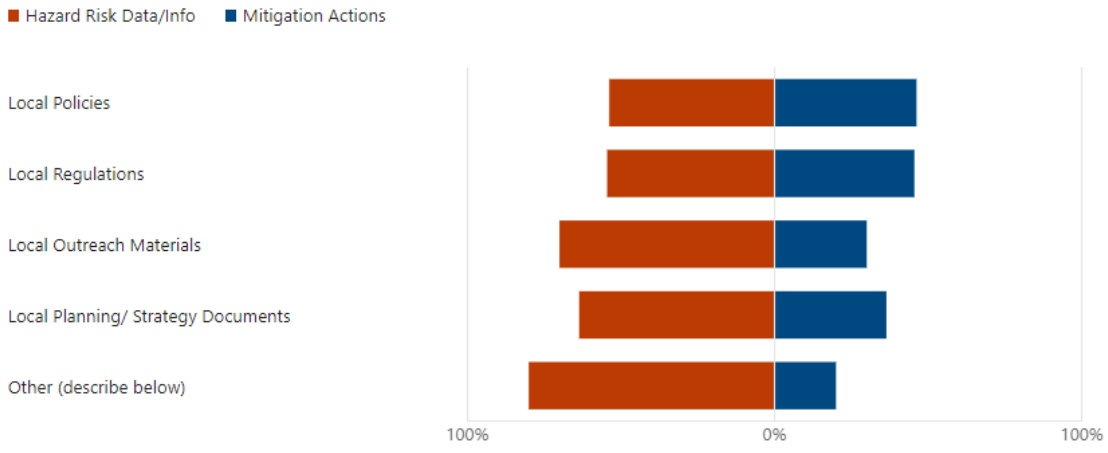
Latest Responses

6 respondents (**46**%) answered **Struggle** for this question.



9. Does your community use data or mitigation actions from the State enhanced mitigation plan in its local plans, policies, regulations, or outreach? Please share where and how the information and actions from the State plan are integrated into your community efforts.

More Details



10. If you selected "Other" above, please describe.

More Details Insights

5
Responses

Latest Responses

11. Can you give an example of how you integrated State plan data/actions? What State data or actions were the most valuable to you?

More Details Insights

9
Responses

Latest Responses

12. What support from the State would help you most in mitigating the hazards in your community?
(Ex: outreach tools or materials, specific hazard risk data, mitigation action ideas, grant funding information, engineering/technical review of proposed actions, etc.)

More Details Insights

21
Responses

Latest Responses

"engineering and technical review- those are very burdensome"

"Have the DOT bring the plows out sooner and when called for an emergency"

...

6 respondents (**29**%) answered **grant funding** for this question.

13. Have you participated in, or plan to participate in, committee or other meetings related to the State plan update?
(Note: If you are interested in participating, the last question in this survey has space to add your contact info)

More Details

Yes, already participating	8
Not yet but I plan to	2
Maybe (not sure)	5
No, not participating	7

14. The State plan is anticipated to be released late 2023 or early 2024. Are you interested in reviewing and providing feedback?

More Details Insights

Yes	8
Maybe	9
No	4

15. If you'd like to receive email updates about the plan drafts and progress, or participate in committees or other plan development activities, please enter your contact information below.

More Details Insights

11
Responses

Latest Responses

ID	Start time	Completion time	Email	Community Name: What community do you work for or represent?	Please select the top 4 hazards you think are the biggest threat to your community:	What other hazard(s) not listed above should be considered?	If you have any examples of a recent mitigation actions which successfully reduced risk in your community, please share them below. Otherwise leave blank.
1	6/12/23 8:24:22	6/12/23 8:32:55	anonymous	Bismarck, ND - Department of Emergency Services - Homeland Security	Cyberattack, Drought, Extreme Winter Storm Events, Transportation Disaster (Road or Rail Crash)	utility disruption, mental health crisis, environmental crisis	home buy-out to expand the open flood plain, investing in positive public space that can act as flood control zones, education regarding cyber malware, winter weather information maps such as the NDDOT road map app, shelters in campgrounds
2	7/6/23 8:09:41	7/6/23 8:13:48	anonymous	Barnes County	Dam Failure, Extreme Winter Storm Events, Flood, Transportation Disaster (Road or Rail Crash)		Flood walls in the city of Valley City
3	7/6/23 8:09:48	7/6/23 8:23:28	anonymous	McLean County	Windstorm / High Wind Events, Wildfire, Dam Failure, Hazardous Material Event		
4	7/6/23 8:38:05	7/6/23 8:46:44	anonymous	LaMoure County	Flood, Extreme Winter Storm Events, Windstorm / High Wind Events, Hazardous Material Event	Public Health - Virus or other transmittable disease	
5	7/6/23 8:17:46	7/6/23 8:49:48	anonymous	Cass County	Flood, Transportation Disaster (Road or Rail Crash), Tornado	Cyber	
6	7/6/23 8:39:56	7/6/23 9:00:25	anonymous	Cavalier County	Extreme Winter Storm Events, Wildfire, Windstorm / High Wind Events, Drought	Cyber	Generator on PSAP facility kept 911 going and radio communications throughout the last long power outage we had .
7	7/6/23 8:32:40	7/6/23 9:12:06	anonymous	McKenzie	Extreme Winter Storm Events, Flood, Tornado, Hazardous Material Event		1) Had Posts removed from Cherry Creek - which I have worked on for years. 2) Recently met with NDFS and the USFS, BLM and Fire Chiefs and LEPC Chairman to discuss a high risk fire area that has extremely high fuels and has problems with Egress. This area involves two counties and backs up to tribal lands. Will be meeting again to update the CWPP - the one that was done in 2006 was not written for McKenzie County, but for a County in the East. Once that is written we can then apply for a grant to reduce the risks in this area as well as other critical areas in McKenzie County.
8	7/6/23 11:08:34	7/6/23 11:18:21	anonymous	Mountrail County	Extreme Winter Storm Events, Hazardous Material Event, Tornado, Transportation Disaster (Road or Rail Crash)	Summer Storms	Placement of outdoor weather sirens in campgrounds and cities
9	7/6/23 11:19:31	7/6/23 11:24:32	anonymous	Valley City	Flood, Dam Failure, Tornado, Hazardous Material Event		Flood Walls
10	7/6/23 11:37:12	7/6/23 11:47:01	anonymous	Burleigh County	Extreme Winter Storm Events, Flood, Hazardous Material Event, Windstorm / High Wind Events	Cybersecurity (not a natural hazard)	Roads raised, Tavis Flood Control structure, public information in a timely manner, Flood Annex reviewed annually and posted on website
11	7/6/23 11:49:22	7/6/23 11:52:19	anonymous	Emmons County	Extreme Winter Storm Events, Flood, Hazardous Material Event, Windstorm / High Wind Events	Cybersecurity (not a natural hazard)	Flood Annex reviewed annually and posted on website
12	7/6/23 12:49:28	7/6/23 12:50:59	anonymous	Mountrail County	Extreme Winter Storm Events, Drought, Wildfire, Transportation Disaster (Road or Rail Crash)		
13	7/7/23 10:55:42	7/7/23 11:11:14	anonymous	Ward County	Flood, Extreme Winter Storm Events, Windstorm / High Wind Events, Hazardous Material Event		Souris/Mouse River Enhanced Flood Protection Project
14	7/11/23 7:44:54	7/11/23 8:29:37	anonymous	Bowman County	Electric grid failure, Extreme Winter Storm Events, Hazardous Material Event, Wildfire	Civil disturbance	
15	8/23/23 8:59:05	8/23/23 9:09:07	anonymous	Logan County, North Dakota	Extreme Winter Storm Events, Flood, Hazardous Material Event, Drought		Removal of old trees in the city of Gackle and planting of new trees to control runoff. The city of Napoleon is retrofitting/upgrading its water system, installed a new water tower, and is installing an outdoor emergency siren at the city park.
16	8/23/23 9:27:45	8/23/23 10:26:11	anonymous	Mountrail County	Extreme Winter Storm Events, Flood, Transportation Disaster (Road or Rail Crash), Summer storms	Summer storms	

ID	Start time	Completion time	Email	Community Name: What community do you work for or represent?	Please select the top 4 hazards you think are the biggest threat to your community:	What other hazard(s) not listed above should be considered?	If you have any examples of a recent mitigation actions which successfully reduced risk in your community, please share them below. Otherwise leave blank.
17	8/23/23 11:04:31	8/23/23 11:07:59	anonymous	LaMoure	Drought, Flood, Extreme Heat, Extreme Winter Storm Events		
18	8/23/23 11:13:59	8/23/23 11:31:04	anonymous	LaMoure County	Extreme Winter Storm Events, Flood, Tornado, Hazardous Material Event	n/a	Our emergency response teams are all volunteer but they do have some trainings in response to disasters. There is a policy and procedure book that covers what to do in these types of disasters but i'm not sure that all responders are trained or educated on the policies and procedures.
19	8/23/23 11:42:09	8/23/23 12:06:23	anonymous	McKenzie County	Tornado, Flood, Wildfire, Extreme Winter Storm Events	Active Shooter, Protest (similar to DAPL)	I had thick posts that were in Cherry Creek out in the County and this past year our County finally had them removed. This will prevent ice from jamming should we have that kind of a year and also prevent flooding.
20	8/28/23 12:18:32	8/28/23 12:30:16	anonymous	Benson County	Extreme Winter Storm Events, Hazardous Material Event, Transportation Disaster (Road or Rail Crash), Windstorm / High Wind Events		Building a dike to protect homes and infrastructure in a community and also buying houses below a certain elevation and relocating part of the town to higher ground.
21	8/29/23 6:50:34	8/29/23 6:57:51	anonymous	LaMoure County	Extreme Winter Storm Events, Flood, Twin Lake overflowing because there is no outlet and taking out the highway and coming into town to harm businesses and home, Hazardous Material Event		
22	8/30/23 13:21:27	8/30/23 13:27:12	anonymous	Foster County	Extreme Winter Storm Events, Hazardous Material Event, Tornado, Transportation Disaster (Road or Rail Crash)		
23	10/12/23 9:24:25	10/12/23 9:26:56	anonymous	LaMoure	Drought, Tornado, Flood, Hazardous Material Event	Covid	
24	10/19/23 11:28:45	10/19/23 11:34:38	anonymous	LaMoure County	Hazardous Material Event, Tornado, Wildfire, Transportation Disaster (Road or Rail Crash)	Power Grid Failure	Dikes at low areas of LaMoure to prevent flooding of James River into community.

ID	What challenges or obstacles do you face when developing or performing mitigation actions in your community?	How do you most successfully conduct outreach & share hazard information with your community members? (Select your top 3)	If you have any examples of innovative outreach or engagement strategies that were successful in encouraging public participation, please share them below. Otherwise leave blank.	Share your best practices and suggestions for engaging under-represented groups: Who would you like to connect with regarding disasters? What works well for you? Or, what do you struggle with?	Local Policies
1	Rural populations, buy-in, funding, attention to the cause	Public event tables (ex: a County Fair booth), Social media, Website	Surveys, community coffees, speaking to groups that already regularly meet	ND Department of Health and Human Services Health Equity office has great connections and great resources. I would like to work more with new americans coming to the bismarck area	Hazard Risk Data/Info
2	Funding is a challenge and convincing community members.	Newspaper notice, Press release, Public meetings			Mitigation Actions
3	funding	Newspaper notice, Website, Social media			
4	The commitment to change the current mindset, the change to the current landscape, public opinion that it will never happen	Mailers / flyers / newsletters, Social media, Newspaper notice		Struggle with reaching and connecting with individuals, current attitude is that it will not happen, mass mailing does reach everyone in the mailbox	
5	Rural (city) apathy to even get them to participate. Should just be a county plan which covers rural cities. Equity and inclusion in rural communities isn't practical and forces a "stretch" of applicability to satisfy requirements.	Social media, Website		Struggle - We struggle with spending 90% of the time and effort to include less than 5%. Works well - Preparedness and response always emphasizes personal preparedness and self awareness/sustainability for a minimum of 3 days in a major disaster. Hitting this message hard for ALL is the best way to affect safety during a disaster.	Hazard Risk Data/Info
6	disbelief that it could happen here.	Mailers / flyers / newsletters, Public event tables (ex: a County Fair booth), Newspaper notice	I had the best success with local input following an article we did that shared my power outage story (from MN), with citizens in the paper and asked them to share theirs with me. Resulted in quite a bit of input and historical knowledge not being lost.	Our elderly citizens in long term care ficilities	
7	Finding a way to fund projects.	LEPC, Word of mouth, Social media	We wrote our mitigation plan during covid. Getting public participation for this kind of thing is difficult. If it doesn't affect people, they will not come to a meeting. I do bring it up on occassion when the right time arises.	Just an example, when the state des ask that I get all my townships to sign an MOA 4 years ago, not one of them would do so. This year I have worked the townships again (16) and I have sent a request out 4 times this year and have only gotten 3 to sign the MOA. THis is an example of my struggle....	
8	Lack of Interest due to the amount of time it takes to get done	Social media, Public meetings		I don't think I have any under-represented groups, I reach out to the people and they fail to show up or people who are paid to represent these groups, ie., elderly, mentally handicap, don't show up to the meetings or reply to the surveys sent to them to fill out, phone calls not returned. I engage and they don't engage back.	
9	Funding	Press release, Public meetings, Social media			Mitigation Actions
10	No staff and getting quotes/bids from contractors	Social media, Website, Newspaper notice	MHMP public survey	Information presented is provided electronically and available in print	Hazard Risk Data/Info
11	No staff and getting quotes/bids from contractors	Newspaper notice, Social media, Website	MHMP public survey	Information presented is provided electronically and available in print. Struggle getting information to elderly and has been provided in the form of grocery bag stuffers.	Hazard Risk Data/Info
12		Press release, Newspaper notice, Word of mouth			
13	Funding, Community Buy In ,	Mailers / flyers / newsletters, Social media, Public meetings			Hazard Risk Data/Info
14	Nobody takes it seriously when planning or exercising, but then complain when issuers arrive when the real thing happens. Its hard to mitigate potential disasters unless they can be identified prior to an incident happening.	Newspaper notice, Social media, Website			Mitigation Actions
15	Everyone locally knows the mitigation actions are good and wants to see them completed but doesn't want to do the work. They look at me to take each project from start to finish with little independent assistance. Also, the financing/funding. Money is always an issue.	Social media, Public meetings, Website	Food and beverage always gets people to meetings. SurveyMonkey now offers QR Codes.	We want to contact the schools and start a Teen CERT class.	Hazard Risk Data/Info
16	Community support	Mailers / flyers / newsletters, Newspaper notice, Social media		Handi-cap community is a struggle, no good numbers of what handi cap and who	Hazard Risk Data/Info

ID	What challenges or obstacles do you face when developing or performing mitigation actions in your community?	How do you most successfully conduct outreach & share hazard information with your community members? (Select your top 3)	If you have any examples of innovative outreach or engagement strategies that were successful in encouraging public participation, please share them below. Otherwise leave blank.	Share your best practices and suggestions for engaging under-represented groups: Who would you like to connect with regarding disasters? What works well for you? Or, what do you struggle with?	Local Policies
17		Mailers / flyers / newsletters, TV / radio ads, Social media			
18	Everyone has an opinion.	Word of mouth, Social media, TV / radio ads	First you need to get the public interested and understanding that what you are doing is important. Then you need to have someone from outside the small community come in to help because no one thinks their neighbor is an expert. Once the public has buy-in then you can provide education and trainings.	Under-represented groups in rural counties are those individuals who do not speak English. I struggle with "use it or lose it". We need to practice responding to disasters, prior to having one.	Mitigation Actions
19	Getting people to participate in formulating mitigation actions/ideas	Social media, Public event tables (ex: a County Fair booth), Word of mouth	We have had two Preparedness fairs in the last two years. Hoping it grows more each year.	We recently added a Spanish McKenzie County Emergency Management Facebook page as we have a large Spanish population. We do not want to leave anyone out. I have also been asked to speak at larger companies safety meetings. I work and exercise with most of our major energy companies in our County. Building relationships truly pays off.	
20	Getting community involvement in understanding why it is important and to help in identifying mitigation projects. Finances are always a problem in small communities	Newspaper notice, Social media, Word of mouth	We have done surveys on our social media sites, people are slowly adapting to completing the surveys.	We do struggle in identifying these groups and being able to contact and engage with them	
21	Conflicts between parties perhaps.	Public meetings, Social media, Mass text messages			
22	lack of snow storm resources for responding to emergencies	Newspaper notice, TV / radio ads, Social media			Mitigation Actions
23		Mailers / flyers / newsletters, Newspaper notice, TV / radio ads			
24		Public meetings, Social media, Website			Mitigation Actions

ID	Local Regulations	Local Outreach Materials	Local Planning/ Strategy Documents	Other (describe below)	If you selected "Other" above, please describe.
1	Mitigation Actions	Hazard Risk Data/Info	Mitigation Actions		
2	Hazard Risk Data/Info	Hazard Risk Data/Info	Hazard Risk Data/Info		
3					
4					
5	Mitigation Actions	Mitigation Actions	Mitigation Actions		
6					
7					Have not read the state enhanced mitigation plan. Finding time to read everything is a challenge.
8					
9					
10	Hazard Risk Data/Info	Hazard Risk Data/Info	Hazard Risk Data/Info	Hazard Risk Data/Info	Data graphs/charts
11	Hazard Risk Data/Info	Hazard Risk Data/Info	Hazard Risk Data/Info	Hazard Risk Data/Info	Charts/Graphs
12					
13	Hazard Risk Data/Info	Hazard Risk Data/Info			
14	Mitigation Actions		Mitigation Actions		
15	Hazard Risk Data/Info	Hazard Risk Data/Info	Hazard Risk Data/Info	Hazard Risk Data/Info	
16					

ID	Local Regulations	Local Outreach Materials	Local Planning/ Strategy Documents	Other (describe below)	If you selected "Other" above, please describe.
17					
18	Mitigation Actions	Mitigation Actions	Hazard Risk Data/Info		
19					I do not know what the State Enhanced Mitigation plan is about.
20			Hazard Risk Data/Info		
21				Hazard Risk Data/Info	I actually am not sure on this.
22	Mitigation Actions	Mitigation Actions	Mitigation Actions	Mitigation Actions	
23					
24	Hazard Risk Data/Info	Hazard Risk Data/Info	Hazard Risk Data/Info		

ID	Can you give an example of how you integrated State plan data/actions? What State data or actions were the most valuable to you?	What support from the State would help you most in mitigating the hazards in your community? (Ex: outreach tools or materials, specific hazard risk data, mitigation action ideas, grant funding i...	Have you participated in, or plan to participate in, committee or other meetings related to the State plan update? (Note: If you are interested in participating, the last question in this survey ...	The State plan is anticipated to be released late 2023 or early 2024. Are you interested in reviewing and providing feedback?
1	Utilizing information from the state mitigation plan to guide other planning practices. Using the data from this plan is very helpful.	Specific hazard risk data with maps/images	Yes, already participating	Yes
2		grant funding information and training on the different things to put into the plan.	No, not participating	Maybe
3		mitigation action items & outreach tools or materials	Maybe (not sure)	Yes
4	Use	Engineering and project management are huge factor in limiting large projects; The technical management adds a cost to all these projects.	Yes, already participating	Maybe
5	Number of overall disasters and the financial impact on a state footprint has a greater impact.	Grant funding information to include timeline updates of entire process from bringing on contracted services with grant dollars to updates regarding mitigation grant requests. An active/real time informational link would be invaluable as opposed to initial submission and then hearing nothing for months on end.	Yes, already participating	Maybe
6		All would be helpful however I believe the mitigation action ideas, and grant funding information are of the most value	No, not participating	Maybe
7		Having access to DES staff has been a Great help and through them is usually how I get the information I need. They are very helpful.	No, not participating	Maybe
8		you are already do all you can	Maybe (not sure)	No
9		Grant Funding	Not yet but I plan to	Yes
10	Hazard data charts/graphs	Never had any issues--just call and ask NDDES!	Yes, already participating	Yes
11	Hazard data charts/graphs	No problems--just call and ask NDDES!	Yes, already participating	Yes
12				
13		Project Funding,	Yes, already participating	Yes
14		grants and funding	No, not participating	No
15	Hazard history, and profile and inventory information.	Technical review of BCAs to ensure they meet requirements before moving on to full application development.	Yes, already participating	Yes
16	Risk assessment	We need to get more information out to the public on what hazard mitigation planning and plans are	Yes, already participating	Yes

ID	Can you give an example of how you integrated State plan data/actions? What State data or actions were the most valuable to you?	What support from the State would help you most in mitigating the hazards in your community? (Ex: outreach tools or materials, specific hazard risk data, mitigation action ideas, grant funding i...	Have you participated in, or plan to participate in, committee or other meetings related to the State plan update? (Note: If you are interested in participating, the last question in this survey ...	The State plan is anticipated to be released late 2023 or early 2024. Are you interested in reviewing and providing feedback?
17				
18	surveys and studies. I'm most familiar with COVID response and the plans and data that were used in that response.	Hazard risk data and mitigation action ideas for our top risks.	Maybe (not sure)	No
19		Not sure - I guess what helps me most is the Great Staff DES has to work with. They go above and beyond!	No, not participating	Maybe
20	We have used data to share with communities in developing mitigation options in our MHMP	mitigation ideas, grant funding and outreach tools	Not yet but I plan to	Maybe
21		Take Game and Fish out of the equation and think about the safety of the community instead of if the fishing will be good or not.	Maybe (not sure)	Maybe
22		Have the DOT bring the plows out sooner and when called for an emergency	Maybe (not sure)	Maybe

23			No, not participating	No
24		engineering and technical review- those are very burdensome	No, not participating	

B.5.5 Community Survey Publicity and Notice

From:	Brighton, Hope <hopebrighton@nd.gov>
Sent on:	Wednesday, August 23, 2023 2:24:53 PM
To:	Brown, Bill A. <babrown@nd.gov>; Johnson, Neil A. <neiljohnson@nd.gov>; Rodriguez, Misty R. <mirrodriguez@nd.gov>; Lies, Robert J. <rlies@nd.gov>
CC:	Adair, Celinda <Celinda.Adair@atkinsglobal.com>; Donahue, Kathleen B. <kdonahue@nd.gov>; Jensen, Eric <ericjensen@nd.gov>
Subject:	Enhanced Mitigation Plan Survey - Please share!
Attachments:	Public Survey.png (508.32 KB), Local and Tribal Staff.png (514.48 KB)

Follow up:	Follow up
Follow up status:	Completed
Completed on:	Wednesday, August 23, 2023 3:33:00 PM

Hello Regional Coordinators!

We thank you all for all of the support and collaboration that has already taken place to work toward completion of the update! But, we aren't done yet!

We are asking you to share the attached survey and included DRAFT message with your respective emergency managers and ask them to share on their social media pages! The team is utilizing input from the whole community to drive planning efforts and provide additional information to the plan. If you haven't already, please take the survey and then share it with all of your friends!

DRAFT Message: Join The North Dakota Department of **_(include your department name here) _** and the North Dakota Department of Emergency Services in updating the State of North Dakota's Enhanced Mitigation Plan. Public input is an important piece of the update to consider all aspects of the whole community. Please take a moment to scan the attached QR Code(s) and/or see the links to share your thoughts about hazards and risks experience throughout your community!

Link to public survey:
https://forms.office.com/Pages/ResponsePage.aspxid=DwvXh_xekUmgZeIFvD2zCJr9v0TNphpIsGsXK3Y479xUMTVIRktDQ0JOR0kzODNQTDVTRVBOQlU3OS4u&origin=QRCode

Please share the survey as you see fit! If you have any questions, please refer to Hope Brighton (hopebrighton@nd.gov) or Kathleen Donahue (kdonahue@nd.gov).

Thank you for your continued support to enhance our states resiliency!

Hope Brighton
Mitigation Planning Specialist, Individual Assistance Officer

701.328.8185 • 507.273.6154 (m) • hopebrighton@nd.gov • www.des.nd.gov

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Local & Tribal Staff Survey for ND State Enhanced Mitigation Plan

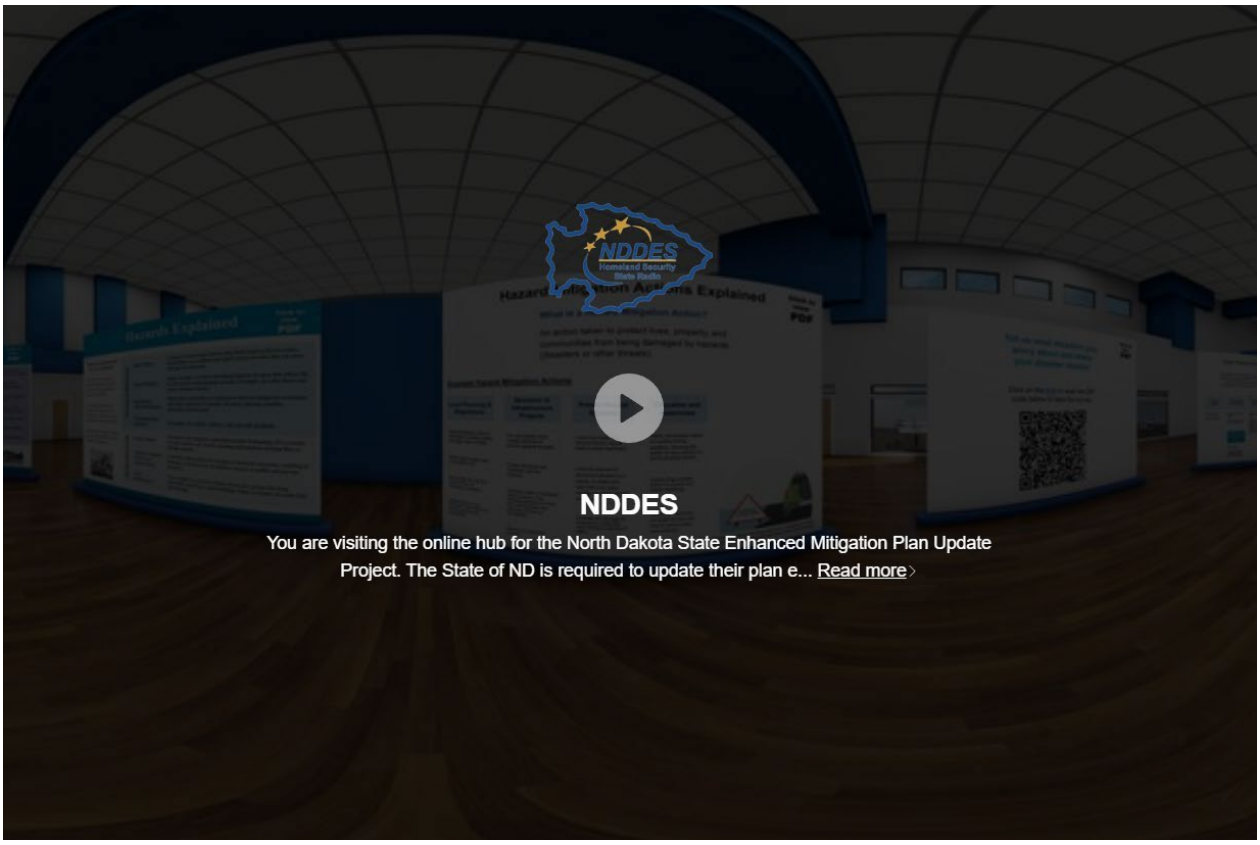
B.5.6 Online Hub Documentation

ND Enhanced Mitigation MAOP Update Project – Online Hub Summary and Documentation

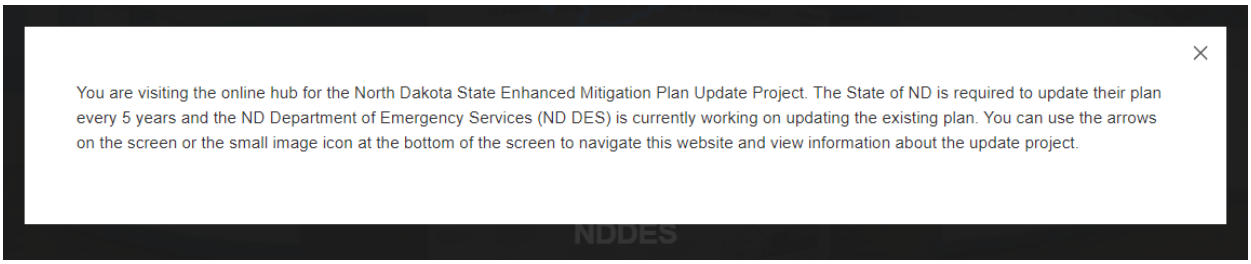
Atkins developed an online hub for NDDES to support web-based engagement for the ND Enhanced Mitigation MAOP Update project. The online hub is a virtual room with display boards showing project information (including timeline and engagement events), links to the current and draft Enhanced Mitigation MAOP plans, and a TV monitor display that shows viewers to the NDDES "Mitigation Matters" video.

The link to the online hub is: https://ths.li/sb14jS0

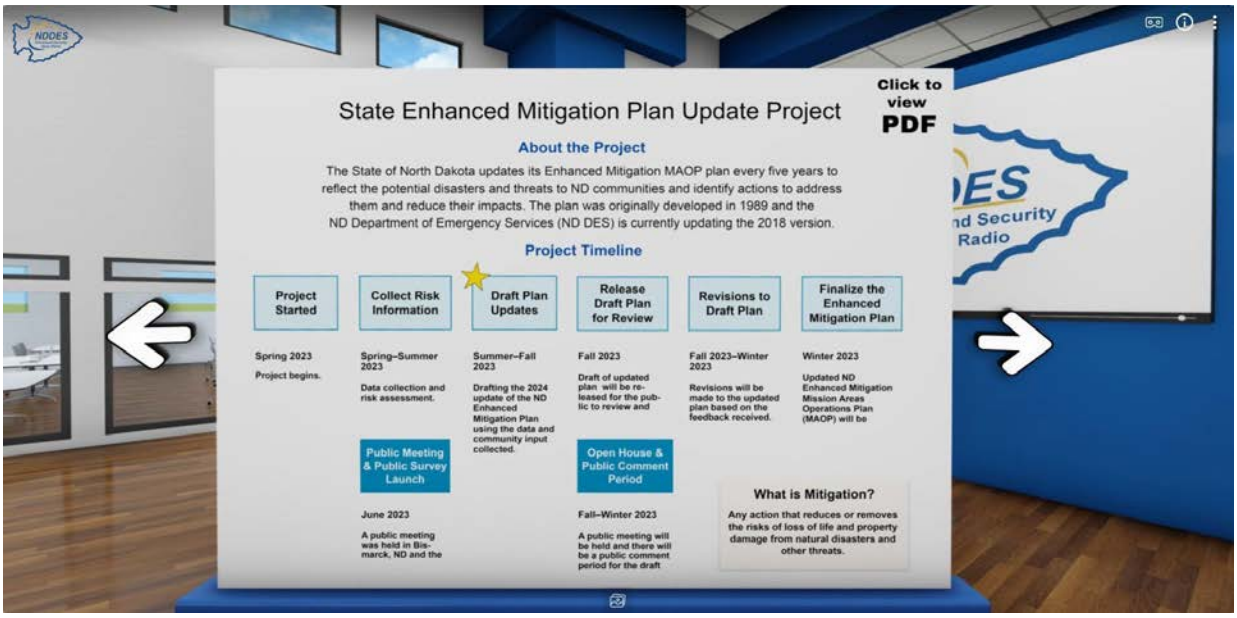
Below are screen shots showing the online hub and its content.



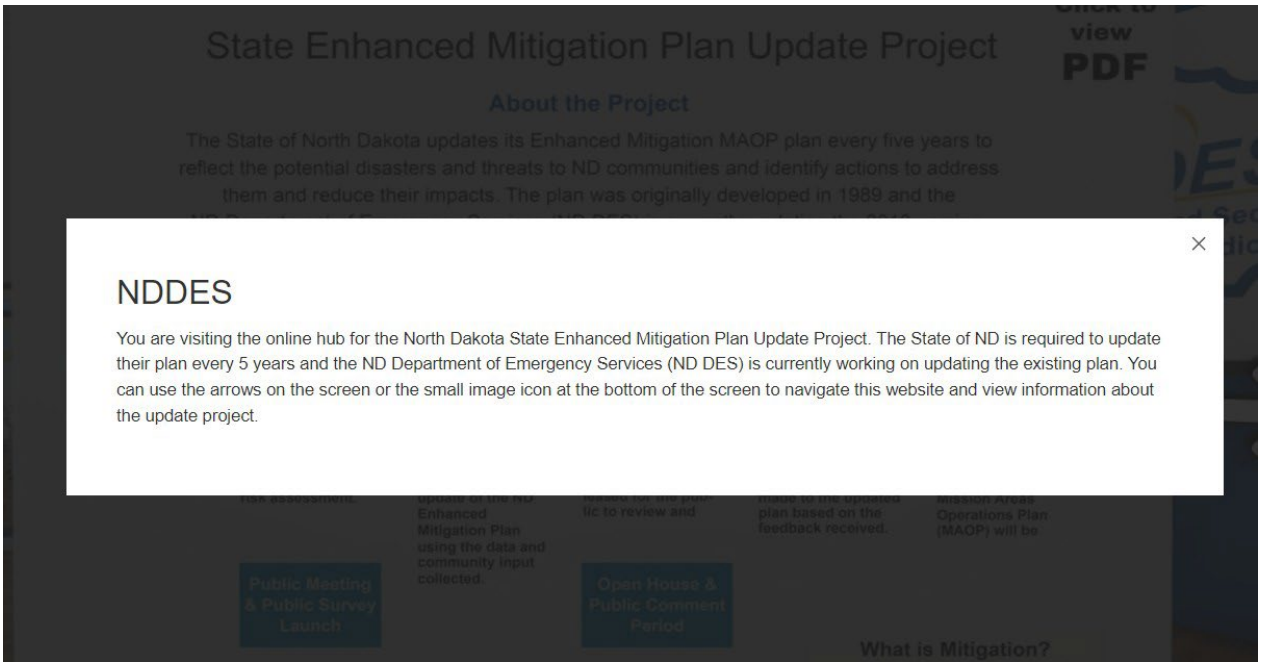
When you click on "Read more", as shown in the image above, the following box pops up.



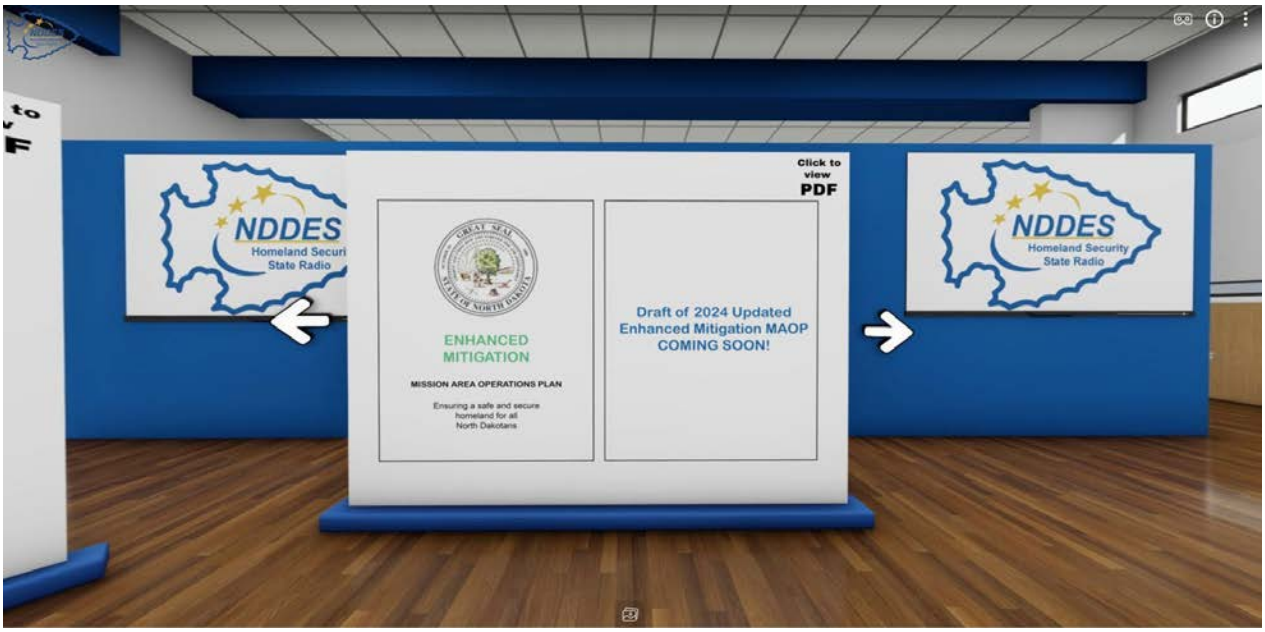
When you click on the play button you enter the virtual room and see the following.



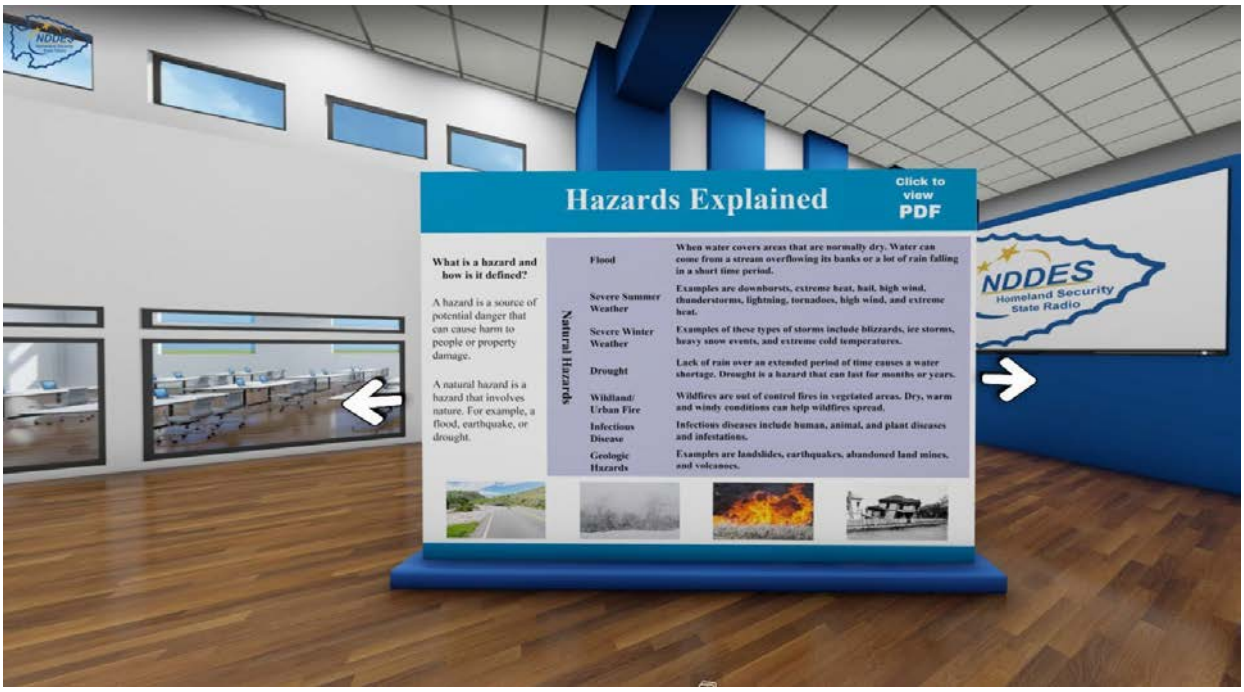
The icon on the bottom lets you navigate through all of the display boards. You can also navigate around the room using the arrows to either side of the display board. You can zoom in and view the display boards in greater detail by clicking on the “Click to view PDF” icon in the upper righthand corner of each display board. In the upper righthand corner of the display screen there is also an information icon and when a visitor clicks on it the following popup appears.

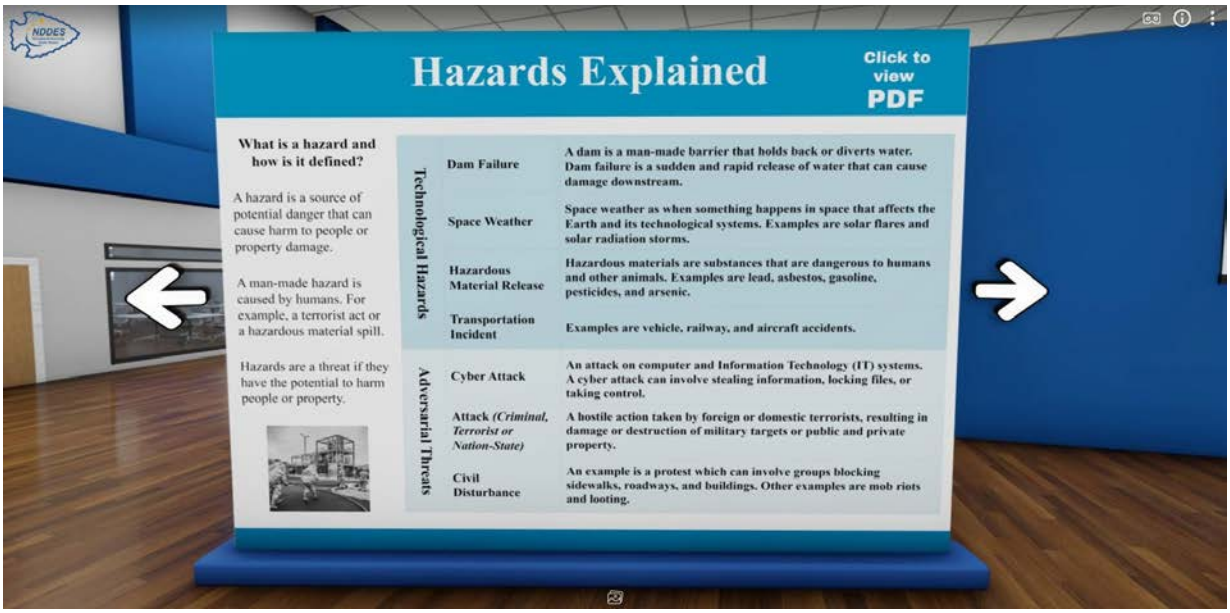


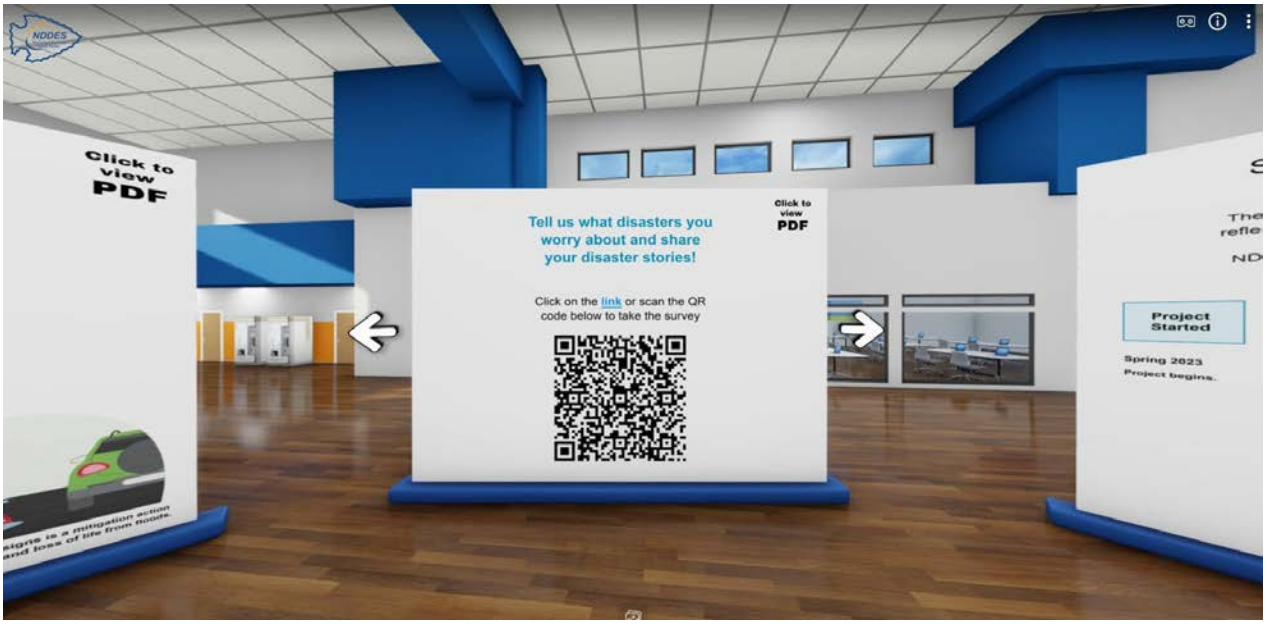
The other display boards are shown below and these can be viewed using the arrows to navigate the room or by using the icon at the bottom of the screen to see thumbnails of all the display boards and then selecting the one the visitor wishes to view.


NDDES
Homeland Security
State Radio
Click to view
PDF
ENHANCED
MITIGATION
MISSION AREA OPERATIONS PLAN
Ensuring a safe and secure homeland for all North Dakotans
Draft of 2024 Updated
Enhanced Mitigation MAOP
COMING SOON!
NDDES
Homeland Security
State Radio


NDDES
Mitigation Matters

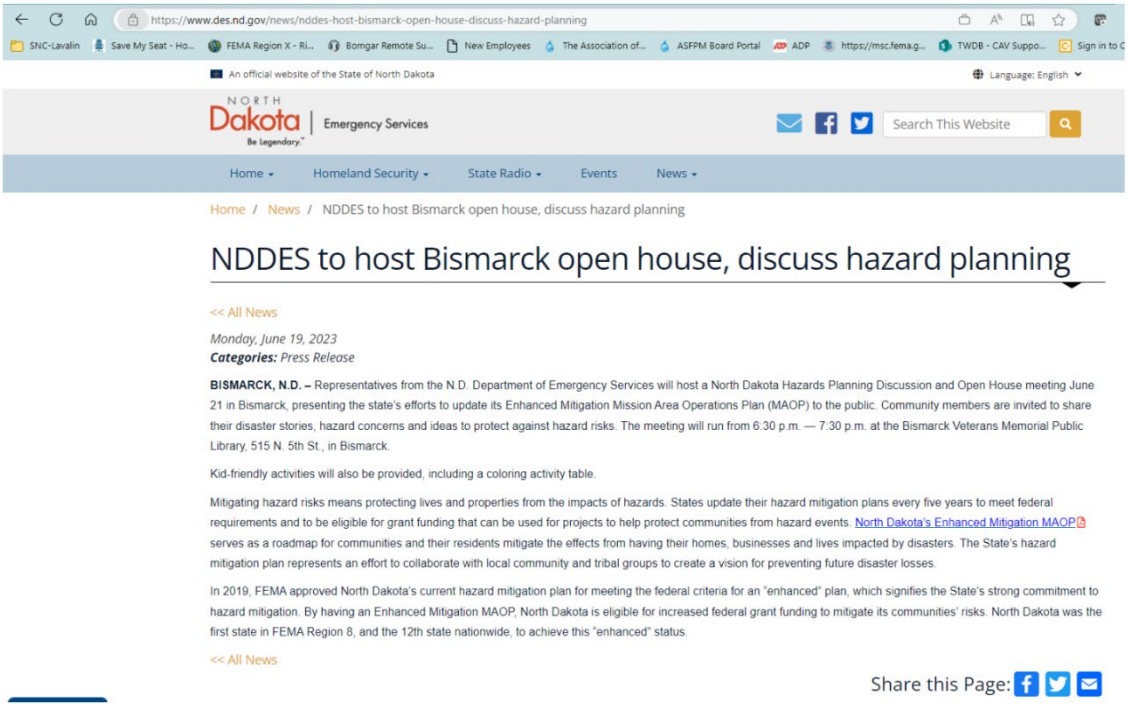

Hazards Explained
Click to view PDF
What is a hazard and how is it defined?
A hazard is a source of potential danger that can cause harm to people or property damage.
A natural hazard is a hazard that involves nature. For example, a flood, earthquake, or drought.
Natural Hazards
Flood
When water covers areas that are normally dry. Water can come from a stream overflowing its banks or a lot of rain falling in a short time period.
Severe Summer Weather
Examples are downbursts, extreme heat, hail, high wind, thunderstorms, lightning, tornadoes, high wind, and extreme heat.
Severe Winter Weather
Examples of these types of storms include blizzards, ice storms, heavy snow events, and extreme cold temperatures.
Drought
Lack of rain over an extended period of time causes a water shortage. Drought is a hazard that can last for months or years.
Wildland/ Urban Fire
Wildfires are out of control fires in vegetated areas. Dry, warm and windy conditions can help wildfires spread.
Infectious Disease
Infectious diseases include human, animal, and plant diseases and infestations.
Geologic Hazards
Examples are landslides, earthquakes, abandoned land mines, and volcanoes.
NDDES
Homeland Security
State Radio


Hazards Explained
Click to view PDF
What is a hazard and how is it defined?
A hazard is a source of potential danger that can cause harm to people or property damage.
A man-made hazard is caused by humans. For example, a terrorist act or a hazardous material spill.
Hazards are a threat if they have the potential to harm people or property.
Technological Hazards
Dam Failure
A dam is a man-made barrier that holds back or diverts water. Dam failure is a sudden and rapid release of water that can cause damage downstream.
Space Weather
Space weather as when something happens in space that affects the Earth and its technological systems. Examples are solar flares and solar radiation storms.
Hazardous Material Release
Hazardous materials are substances that are dangerous to humans and other animals. Examples are lead, asbestos, gasoline, pesticides, and arsenic.
Transportation Incident
Examples are vehicle, railway, and aircraft accidents.
Adversarial Threats
Cyber Attack
An attack on computer and Information Technology (IT) systems. A cyber attack can involve stealing information, locking files, or taking control.
Attack (Criminal, Terrorist or Nation-State)
A hostile action taken by foreign or domestic terrorists, resulting in damage or destruction of military targets or public and private property.
Civil Disturbance
An example is a protest which can involve groups blocking sidewalks, roadways, and buildings. Other examples are mob riots and looting.



The survey and Enhanced MAOP display boards are interactive and visitors can click on the links or use the QR code to access the information and documents. The Mitigation Matters display video screen is also interactive. When visitors press play the video will play in full screen mode. Visitors can also zoom in on display boards by scrolling using the wheel on a mouse. If the PDF versions of the displays are accessed using the icon mentioned before, they can be downloaded and saved for future reference. The display boards were designed to be easily updated throughout the project by replacing the PDFs with revised versions showing updated information.

B.5.7 June Public Meeting Documentation



https://www.des.nd.gov/news/nddes-host-bismarck-open-house-discuss-hazard-planning

SNC-Lavalin | Save My Seat - Ho... | FEMA Region X - Ri... | Bomgar Remote Su... | New Employees | The Association of... | ASFPM Board Portal | ADP | https://msc.fema.g... | TWDB - CAV Suppo... | Sign in to C

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NDDES to host Bismarck open house, discuss hazard planning

<< All News

Monday, June 19, 2023

Categories: *Press Release*

BISMARCK, N.D. – Representatives from the N.D. Department of Emergency Services will host a North Dakota Hazards Planning Discussion and Open House meeting June 21 in Bismarck, presenting the state's efforts to update its Enhanced Mitigation Mission Area Operations Plan (MAOP) to the public. Community members are invited to share their disaster stories, hazard concerns and ideas to protect against hazard risks. The meeting will run from 6:30 p.m. — 7:30 p.m. at the Bismarck Veterans Memorial Public Library, 515 N. 5th St., in Bismarck.

Kid-friendly activities will also be provided, including a coloring activity table.

Mitigating hazard risks means protecting lives and properties from the impacts of hazards. States update their hazard mitigation plans every five years to meet federal requirements and to be eligible for grant funding that can be used for projects to help protect communities from hazard events. North Dakota's Enhanced Mitigation MAOP serves as a roadmap for communities and their residents mitigate the effects from having their homes, businesses and lives impacted by disasters. The State's hazard mitigation plan represents an effort to collaborate with local community and tribal groups to create a vision for preventing future disaster losses.

In 2019, FEMA approved North Dakota's current hazard mitigation plan for meeting the federal criteria for an "enhanced" plan, which signifies the State's strong commitment to hazard mitigation. By having an Enhanced Mitigation MAOP, North Dakota is eligible for increased federal grant funding to mitigate its communities' risks. North Dakota was the first state in FEMA Region 8, and the 12th state nationwide, to achieve this "enhanced" status.

<< All News

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AGENDA

State of North Dakota Hazards Planning Discussion and Open House

June 21, 2023

1.	Welcome
2.	Presentation by State of ND Department of Emergency Services
3.	Discussion / Questions?
4.	Open House

WELCOME!

ND Hazards Planning Discussion and Open House

Today's event is designed to be a public information sharing opportunity for the State Enhanced Mitigation Plan Update project

Please follow these 3 steps:

Step 1: Sign-in and find a seat for a brief presentation that will start at 6:35 PM

Step 2: After the presentation tour the room and check out the information and input boards

Step 3: Share your stories and feedback at the info boards and take the survey

NORTH Dakota | Emergency Services
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Tell us what disasters worry or scare you and share your disaster stories!

Use the QR Code below to take the survey.

Hazards Explained

What is a hazard? How is it defined?

A source of potential danger that can cause harm to people or property damage.

A natural hazard is a hazard that involves nature. For example, a flood, earthquake, or drought.

A man-made hazard is caused by humans. For example, a terrorist act or a hazardous material spill.

Hazards are a threat if they have the potential to harm people or property.

Natural Hazards	**Flood**	When water covers areas that are normally dry. Water can come from a stream overflowing its banks or a lot of rain falling in a short time period.
	Severe Summer Weather	Examples are downbursts, extreme heat, hail, high wind, thunderstorms, lightning, tornadoes, high wind, and extreme heat.
	Severe Winter Weather	Examples of these types of storms include blizzards, ice storms, heavy snow events, and extreme cold temperatures.
	Drought	Lack of rain over an extended period of time causes a water shortage. Drought is a hazard that can last for months or years.
	Wildland/Urban Fire	Wildfires are out of control fires in vegetated areas. Dry, warm and windy conditions can help wildfires spread.
	Infectious Disease	Infectious diseases include human, animal, and plant diseases and infestations. Each species has its own natural immune system that wards off many diseases.
	Geologic Hazards	Examples are landslides, earthquakes, abandoned land mines, and volcanoes.
Technological Hazards	**Dam Failure**	A dam is a man-made barrier that holds back or diverts water. Dam failure is a sudden and rapid release of water that can cause damage downstream.
	Space Weather	Space weather as when something happens in space that affects the Earth and its technological systems. Examples are solar flares and solar radiation storms.
	Hazardous Material Release	Hazardous materials are substances that are dangerous to humans and other animals. Examples are lead, asbestos, gasoline, pesticides, ammonia, and arsenic.
	Transportation Incident	Examples are vehicle, railway, and aircraft accidents.
Adversarial Threats	**Cyber Attack**	An attack on computer and Information Technology (IT) systems. A cyber attack can involve stealing information, locking files, or taking control of an IT system.
	Attack *(Criminal, Terrorist or Nation-State)*	A hostile action taken by foreign or domestic terrorists, resulting in damage or destruction of military targets or public and private property. An attack may result in civilians or military deaths.
	Civil Disturbance	An example is a protest which can involve groups blocking sidewalks, roadways, and buildings. Other examples are mob riots, looting, and gang activity.

Which hazards worry you the most?

Place stickers next to the hazards that concern you the most.

Natural Hazards	Flood	
	Severe Summer Weather	
	Severe Winter Weather	
	Drought	
	Wildland/Urban Fire	
	Infectious Disease	
	Geologic Hazards	
Technological Hazards	Dam Failure	
	Space Weather	
	Hazardous Material Release	
	Transportation Incident	
Adversarial Threats	Cyber Attack	
	Attack *(Criminal, Terrorist or Nation-State)*	
	Civil Disturbance	

Share Your Story!

Have you experienced a disaster event in North Dakota?

- What type of disaster was it?
- Where and when did it happen?
- How did the disaster impact your life and your community?

If so, Please tell us your story in the space below.

Thank you for sharing your experience!

State Enhanced Mitigation Plan Update Project Timeline

About the Project

This plan is updated every 5 years to reflect the potential disasters and threats to ND communities and identify actions to address them and reduce their impacts. The plan was originally developed in 1989 and has been updated regularly, most recently in 2018.

What is Mitigation?

Any action that reduces or removes the risks of loss of life and property damage from natural disasters and other threats.

Project Started

Spring 2023

The ND Department of Emergency Services and its partners kicked off the project.

Collect Risk Information

Spring–Summer 2023

The team is collecting data and information about the risk of different types of disasters and threats impacting North Dakota's communities.

Planning Discussion & Open House

June 21, 2023

Today's event is part of the process to gather community input.

Draft Plan Updates

Summer–Fall 2023

Prepare an updated draft of the state's Enhanced Mitigation Plan using the data and community input collected.

Identify ways to combat disaster risks and prevent damage to communities

Release Draft Plan for Review

Fall–Winter 2023

A draft of the updated plan will be released for partners and the public to review.

Open House & Public Comment Period

Fall–Winter 2023

Another public event will be held. The public will have an opportunity to review and comment on the draft plan.

Revisions to Draft Plan

Fall 2023–Spring 2024

The team will make any changes that are needed to the draft plan after reviewing the feedback.

Finalize the Enhanced Mitigation Plan

Winter 2023–Spring 2024

Finalize the updated ND Enhanced Mitigation Mission Areas Operations Plan (MAOP) and publish it online.

Hazard Mitigation Actions Explained

What is a Hazard Mitigation Action?

An action taken to protect lives, property, and communities from being damaged by hazards (disasters or other threats).

See a bright idea you like? Mark your favorites with stickers!

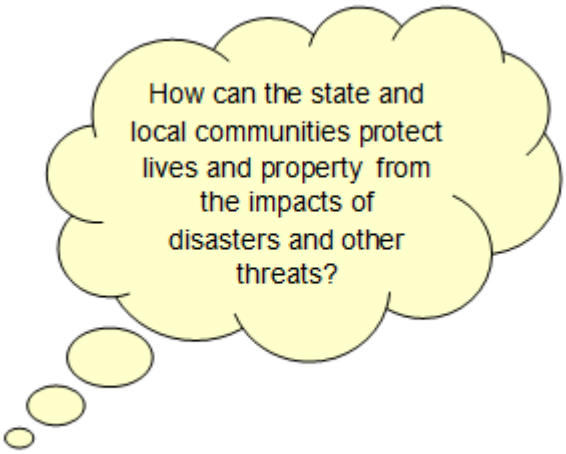
Example Hazard Mitigation Actions

Local Planning & Regulations	Structure or Infrastructure Projects	Protect Natural Systems	Education and Awareness
Adopt Building Codes to strengthen building safety (earthquake, wind, floods).	Fix and update water supply systems to protect against drought.	Limit how close to a stream homes can be built in areas that flood.	Public information about air quality during wildfires, advising the public to stay indoors or avoid inhaling smoke
Adopt water usage rules in drought years.	Protect facilities like hospitals and fire stations.	Limit the amount of pavement allowed on a parcel, to make sure rain water can seep into the ground and refill aquifers.	Conducting Tornado drills in schools and public buildings
Encourage the use and construction of emergency shelters.	Stabilize cliffs or hillsides with terraces or by planting grasses to hold the soil together and prevent erosion or Landslides.	Prohibit the storage of hazardous materials near streams that flood often.	Training or outreach on cyber threats and how to protect data and websites
Adopt rules or crop transport restrictions to prevent pests from spreading	Repair or construct levees.		

Putting up flood warning signs is a mitigation action taken to prevent damage and loss of life from floods

Share Your Mitigation Action Ideas Here!

- What type of hazard (disaster or threat)?
- What is the action?



Thank you for sharing your ideas!

STATE OF NORTH DAKOTA HAZARDS PLANNING DISCUSSION AND PUBLIC OPEN HOUSE – JUNE 21, 2023

Name	Address *(Optional)*	Email Address *(Optional)*	Do You Want to be Notified About Future Meetings? (Yes / No)
Krista Dooley	140 Kerim Sandelback Rd	findooley@gmail.com	Yes
PAUL NEILAN	1954 1st STREET #390, HIGHLAND PK, IL 60035		No
Katie Leitch	223 W. Front Ave Bismarck ND 58504	Katieleitch@nd.gov	yes
MARV ABRAHAM	6050 93rd ST SE BISMARCK ND 58504		Yes
Sam Kroll			no
Gary Stockert		gstockert@bismarcknd.gov	yes
Amanda Jensen	Mandan, ND	amjensen01@gmail.com	
Alex Jensen	Mandan, ND		yes

1

7:20

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ND Dept of Emergency Services
Jun 22 ·

We talked floods, droughts, severe summer weather, cyberattacks, space weather and other hazards and threats in North Dakota. Thank you to all who attended our Hazards Planning Discussion and Open House at the Bismarck Veterans Memorial Public Library last night! It was a great opportunity to visit with the public to hear their disaster stories and hazard concerns and also share ideas about how to protect against hazard risks. Our younger guests even helped to identify hazards while enjoying cookies and some coloring activities!

To learn more about how our state works to mitigate the impacts of hazards and threats, check out our State Hazard Mitigation Report at https://bit.ly/3VFUofr

📸 by Sam Kroll, North Dakota National Guard, and Eric Jensen, NDDES.

Home Friends Video Marketplace Notifications Menu

OPEN MEETING

NDDES
Homeland Security
State Radio

WHAT HAZARDS AFFECT *YOUR* COMMUNITY?

Join us in-person to discuss North Dakota's plans to make the state safer from hazards and disasters such as floods, winter storms, and infectious diseases. We want to hear your thoughts on how best to protect residents, property, businesses, and infrastructure from hazard damage! Share your ideas for how we can make ND communities safer from disasters.

6 P.M.- 8:30 P.M.

NOV. 9, 2023

EAGLES CLUB

345 12th Ave. NE
Valley City, ND

des.nd.gov • www.facebook.com/ndemergencyservices

From: Brighton, Hope
To: Jessica Jenrich
Cc: Adair, Celinda
Subject: Media Release
Date: Friday, November 3, 2023 7:06:59 AM
Attachments: Outlook-vowqiobc.png
Media Advisory_N.D. Department of Emergency Services to host Valley City open house, discuss hazard planning.docx

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Hi Jessica!

I was wondering if you could send this media release to your local media partners for them to broadcast!
Thank you!

Hope Brighton
Mitigation Planning Specialist, Individual Assistance Officer

701.328.8185 • 507.273.6154 (m) • hopebrighton@nd.gov • www.des.nd.gov

NORTH Dakota | Emergency Services
Be Legendary.

From: Brighton, Hope
To: mail@valleynewslive.com
Cc: Donahue, Kathleen B.; Adair, Celinda; Jessica Jenrich
Subject: Public Meeting on November 9th - PLEASE SHARE!
Date: Monday, November 6, 2023 8:59:43 AM
Attachments: Outlook-eszdn4wb.png
Media Advisory_N.D. Department of Emergency Services to host Valley City open house, discuss hazard planning (1).docx

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Hello Valley News Live!

Please share the attached information for the meeting at the Eagles Club in Valley City on November 9th.

We are happy to participate in an interview or other promotional efforts for this event. Thank you!

Hope Brighton
Mitigation Planning Specialist, Individual Assistance Officer

701.328.8185 • 507.273.6154 (m) • hopebrighton@nd.gov • www.des.nd.gov

NORTH Dakota | Emergency Services
Be Legendary.

MEDIA ADVISORY | **FOR IMMEDIATE RELEASE** | Nov. 6, 2023

N.D. Department of Emergency Services to host Valley City open house, discuss hazard planning

BISMARCK, N.D. – Representatives from the N.D. Department of Emergency Services will host a North Dakota Hazards Planning Discussion and Open House meeting Nov. 9 in Valley City, presenting the state's efforts to update its Enhanced Mitigation Mission Area Operations Plan (MAOP) to the public. Community members are invited to share their disaster stories, hazard concerns and ideas to protect against hazard risks. The meeting will run from 6 p.m. — 8:30 p.m. at the Eagles Club, 345 12th Ave. NE in Valley City, North Dakota.

Kid-friendly activities will also be provided, including a coloring activity table.

Mitigating hazard risks means protecting lives and properties from the impacts of hazards. States update their hazard mitigation plans every five years to meet federal requirements and to be eligible for grant funding that can be used for projects to help protect communities from hazard events. North Dakota's Enhanced Mitigation MAOP serves as a roadmap for communities and their residents mitigate the effects from having their homes, businesses and lives impacted by disasters. The State's hazard mitigation plan represents an effort to collaborate with local community and tribal groups to create a vision for preventing future disaster losses.

In 2019, FEMA approved North Dakota's current hazard mitigation plan for meeting the federal criteria for an "enhanced" plan, which signifies the State's strong commitment to hazard mitigation. By having an Enhanced Mitigation MAOP, North Dakota is eligible for increased federal grant funding to mitigate its communities' risks. North Dakota was the first state in FEMA Region 8, and the 12th state nationwide, to achieve this "enhanced" status.

WHAT: North Dakota Hazards Open House Discussion

WHEN: 6 p.m. — 8:30 p.m. CST Thursday, Nov. 9

WHERE: Eagles Club, 345 12th Ave. NE, Valley City, North Dakota

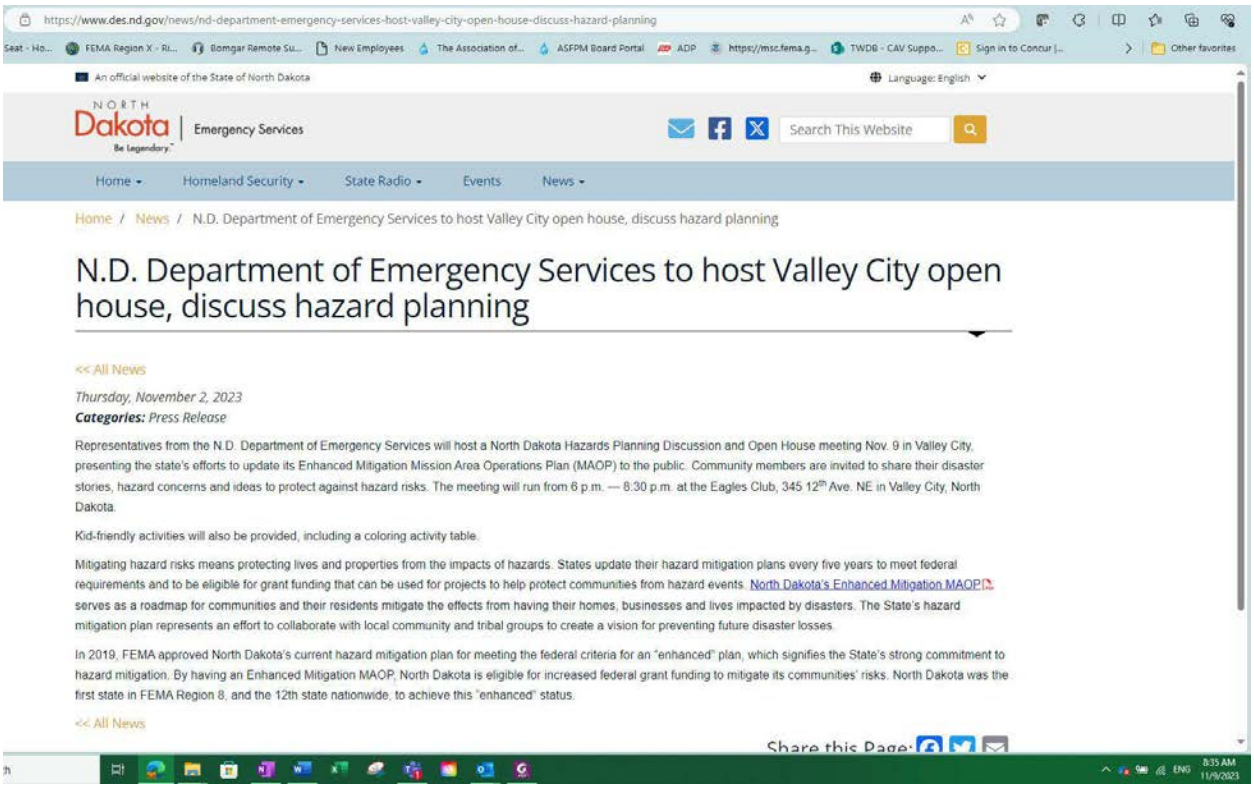
MEDIA: Media members are invited. Coordinate with

-###-

For More Information, Contact:

North Dakota Department of Emergency Services
701-328-8154

701-391-8158 (cell)



https://www.des.nd.gov/news/nd-department-emergency-services-host-valley-city-open-house-discuss-hazard-planning

An official website of the State of North Dakota

Language: English

NORTH Dakota Be Legendary. | Emergency Services

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Home / News / N.D. Department of Emergency Services to host Valley City open house, discuss hazard planning

N.D. Department of Emergency Services to host Valley City open house, discuss hazard planning

<< All News

Thursday, November 2, 2023

Categories: *Press Release*

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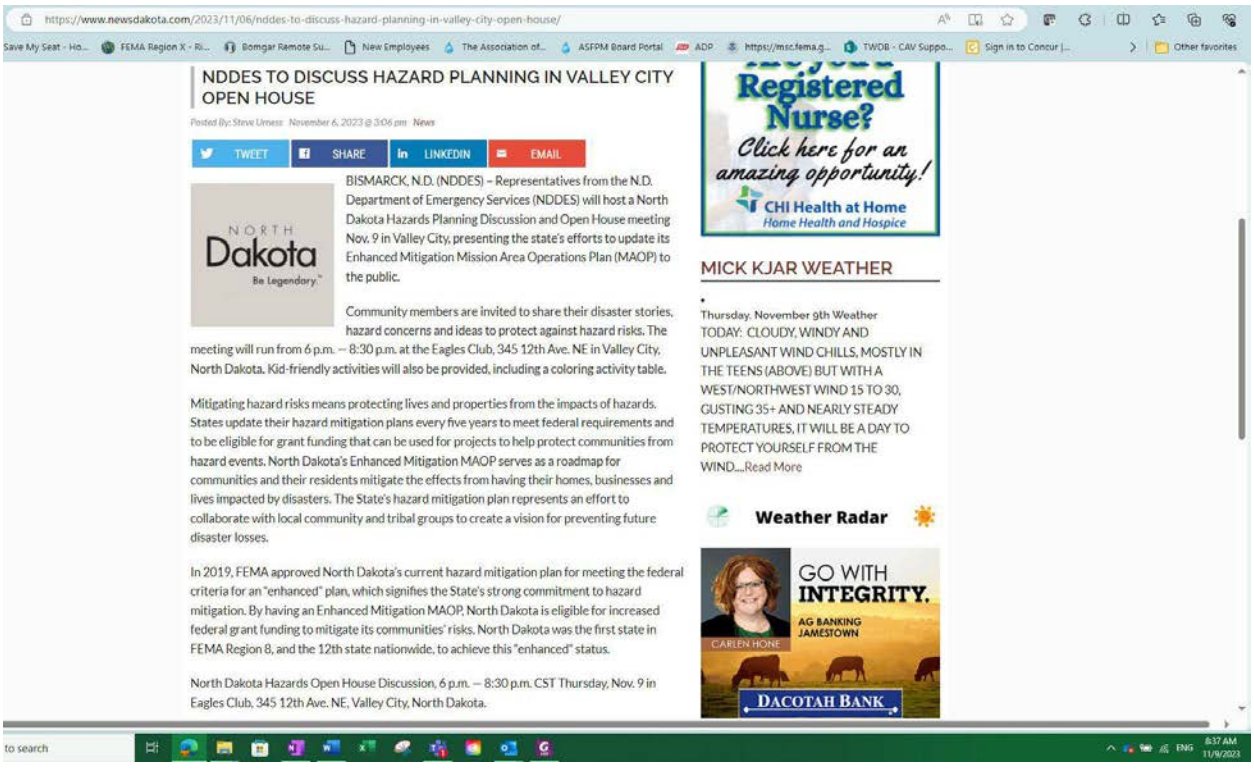

https://www.newsdakota.com/2023/11/06/nddes-to-discuss-hazard-planning-in-valley-city-open-house/

NDDES TO DISCUSS HAZARD PLANNING IN VALLEY CITY OPEN HOUSE

Posted By: Steve Umess November 6, 2023 @ 3:06 pm News

TWEET SHARE LINKEDIN EMAIL

BISMARCK, N.D. (NDDES) – Representatives from the N.D. Department of Emergency Services (NDDES) will host a North Dakota Hazards Planning Discussion and Open House meeting Nov. 9 in Valley City, presenting the state's efforts to update its Enhanced Mitigation Mission Area Operations Plan (MAOP) to the public.

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North Dakota Hazards Open House Discussion, 6 p.m. – 8:30 p.m. CST Thursday, Nov. 9 in Eagles Club, 345 12th Ave. NE, Valley City, North Dakota.

MICK KJAR WEATHER

Thursday, November 9th Weather

TODAY: CLOUDY, WINDY AND UNPLEASANT WIND CHILLS, MOSTLY IN THE TEENS (ABOVE) BUT WITH A WEST/NORTHWEST WIND 15 TO 30, GUSTING 35+ AND NEARLY STEADY TEMPERATURES, IT WILL BE A DAY TO PROTECT YOURSELF FROM THE WIND....Read More

Weather Radar

AGENDA

State of North Dakota Hazards Mitigation Planning Discussion and Open House

November 9, 2023

5.	Welcome
6.	Presentation by State of ND Department of Emergency Services
7.	Discussion / Questions?
8.	Open House

STATE OF NORTH DAKOTA HAZARDS PLANNING DISCUSSION AND PUBLIC OPEN HOUSE – JUNE 21, 2023

Name	Address *(Optional)*	Email Address *(Optional)*	Do You Want to be Notified About Future Meetings? (Yes / No)
Jessica Jenrich		jjenrich@barnescounty.us	Yes
Jennifer Schultes	Jamestown, ND	director@scarc.org	yes
[illegible]	Valley City, ND	trpub@times-online.com	yes
Bill Brown	NDDES	babrown@nd.gov	yes
Andrew Kirking		akirking@ state[illegible]	Sure
Kathleen Donahue	NDDES	kdonahue@nd.gov	Sure
Brenda Vossler	NDDES	blvossler@nd.gov	
[illegible]	GF, ND	[illegible]@gmail.com	Y

Hope Heather
NDDES
Atkins

B.5.9 Community Coffee and Other Outreach

Example Slide Show

Slide 1

Audience – age range?
Is there an interpreter?
What should we expect?
Goal?

Slide 2

Slide 3

Preparedness, Response, Recovery, Mitigation

Slide 4

Mitigation

- Mitigation is the effort to reduce loss of life and property in order to lessen the impact of disasters on people.
- Mitigation takes place **before and after emergencies.**

Minot, ND Flood Protection Project

Slide 5

Recent Disasters

Slide 6

North Dakota's Hazards/Threats

What worries you?

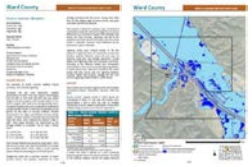
#	Hazard/Threat	#	Hazard Threat
1	Cyberattack	8	Hazardous Materials
2	Flood	9	Space Weather
3	Severe Winter Weather	10	Dam Failure
4	Severe Summer Weather	11	Criminal, Terrorist or Nation-State Attack
5	Fire	12	Geologic Hazards
6	Infectious Diseases & Pest Infestations	13	Civil Disturbance
7	Drought	14	Transportation Incident

Slide 7

Ward County's Top Hazards

High:
- Drought
- Flood
- Severe Summer/Winter Weather

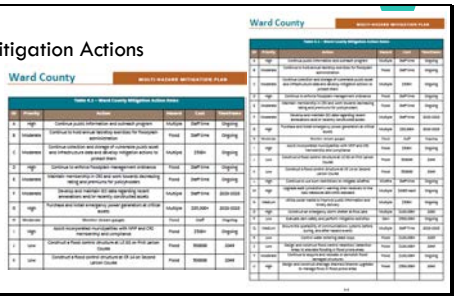
Medium:
- Wildland Fire
- Infectious Disease
- Cyberattack



What worries you the most?

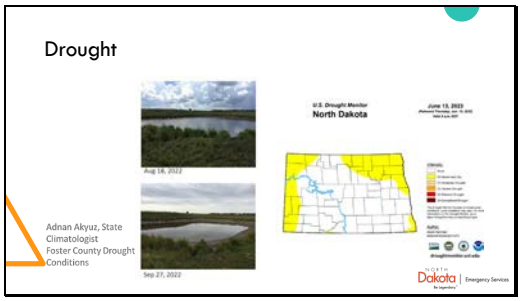
Slide 8

Mitigation Actions



Slide 9

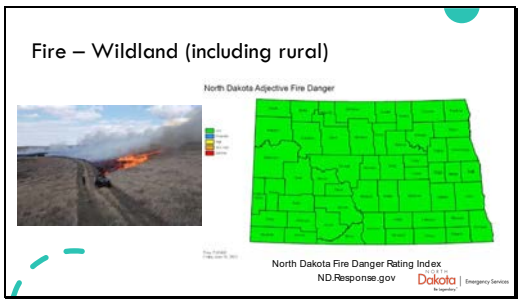
Slide 10



Slide 11

Todd
Flood – You may not have impacts like Fargo, where the flood wall above was needed
But you have had significant damage to your infrastructure through past events

Slide 12



Remember this fire in 2021 that started the new year?
Wildfires tend to be a cascading hazard of drought.
All but one jurisdiction rated this hazard as high. Hettinger gave it a moderate rating.

Slide 13

Todd
This hazard was ranked as low.
But there are sinkholes from underground coal mining activity or where coal seams have been burning northwest of Hettinger and northeast of Haynes.

Slide 14

Adams County is known for its bird hunting season, correct? If so, avian influenza could have a big impact.

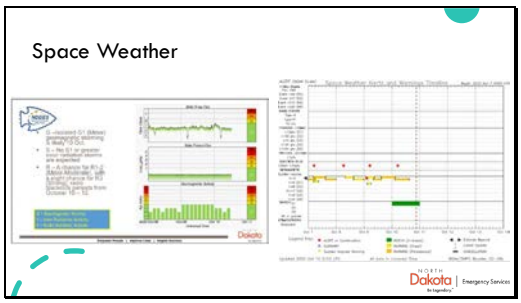
Slide 15

Todd
The elements of severe summer weather include tornadoes, wind, hail and lightning.
there are approximately 178 persons in the county with an enhanced vulnerability to severe summer weather.
Adams County and Hettinger have adopted the State Building Code. This includes a provision that buildings must be constructed to withstand a wind load of 75 mphsconstant and three second gusts of 90 miles per hour.

Slide 16

Todd
How would you like to wake up to seeing your door completely blocked by snow?
There are a large number of seniors living in Adams County. What access do they have to resources if the roads are snowed in?
Structural damage and cleanup costs in the county and the four cities for the October 3-5, 2013 winter storm totaled over $47,000.

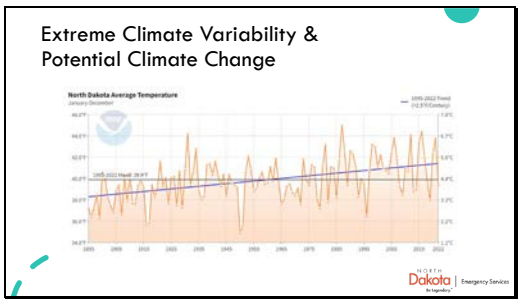
Slide 17



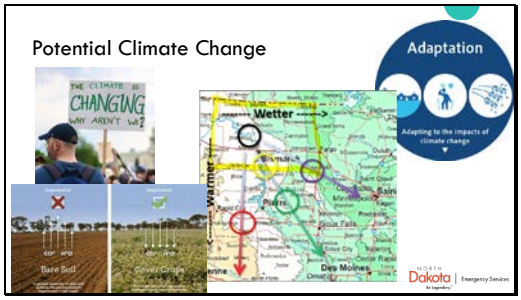
This is the “new frontier of hazards” Here’s what your plan said about the hazard and the potential disruption of our electrical grid system: directly or indirectly on electricity for normal, essential functions such as heating and cooling, obtaining water, waste disposal, food refrigeration, communications, and transportation. If a space weather event caused the loss of power, the impact for a short time would be an inconvenience for most, but critical to life support for a few. Loss of power for a long time could result in the inability to sustain life in Adams County as we know it.

Slide 18

Slide 19



Slide 20



Slide 21

Slide 22

Civil Disturbance

Officials: Richland County Corrections Center Fire Was Set

Law enforcement officials are looking for the person who set a fire at the Richland County Law Enforcement Center in Wahpeton, forcing jail inmates to be moved elsewhere.

Hope

Slide 23

Criminal, Terrorist, or Nation-State Attack

Broadly defined as "any intentional adversarial human-caused incident, domestic or international, that causes mass casualties, large economic losses, or widespread panic in the country."

Hope

Slide 24

Cyberattack

Hope

Slide 25

Dam Failure

Bourbanis Dam, Spring 2022
Source: Valley News Live

Hope

Slide 26

Fire – Urban/Structure Collapse

Downtown Minot Fire, 2021
Source: KFYR TV

Slide 27

Hazardous Material Release

- Annydrous Ammonia Plant

Slide 28

Transportation Incident

Train to Semi Collision
Leeds, ND 2022

(Photo: ND Highway Patrol)

Train Derailment
West of Minot, 2022

Slide 29

Sooo…
this is a lot

Slide 30

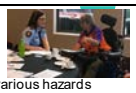
Sooo… what do you think?

- What hazards are most concerning to you and your community?
  Is there a hazard we missed?
- What support methods do you seek in the case of emergency?
- What resources do you use regularly? How might emergency managers work with them to improve access or resilience?

Kathleen – see notes

Slide 31

Discussion



- What groups do you think are most vulnerable to various hazards and threats?
- What added challenges does your community face during disasters?
- How do you foresee climate change impacting how you respond to or plan for emergencies?

Slide 32

Discussion

- How can others advocate for you during an emergency?
- What personal preparedness measures have you taken? What's worked? What hasn't?

Slide 33

What can you do?

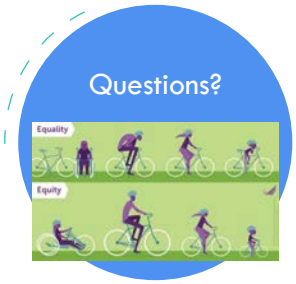
- Document instructions for support worker during emergencies
- Create a household plan and discuss emergency plans
- Plan evacuation routes

Slide 34

Why do we care?

But it's not only about money, it's about you and keeping our communities safe!

Slide 35



Notes

Safe Industry Alliance Meeting

July 26, 2023

The second meeting of the Safe Industry Alliance was held at the Flint Rock Building north of Dickinson, ND. This newly formed organization strives to unite industry and advance safety practices.

Hope Brighton presented information on the ND Department of Emergency Services and particularly the mitigation process. She provided an overview of the states fourteen (14) identified hazards, defining each with examples of recent significant ND events. The presentation included interactive feedback through a google forms survey. Participants engaged in ranking the hazards in order of most significant to them, likelihood of occurring, impact, and vulnerability. Hope provided a few examples of mitigation actions as the survey also provided the opportunity for participants to make suggestions on possible mitigation actions.

The survey results were reviewed and discussed.

The following situations were addressed:

- Saltwater tanks and lightning. The use of lightning rods is less than previous. Lightning strikes can cause significant damage to equipment and/or fire.
- Winter weather. The greatest impact on this group was loss of access due to blocked roads.
- Saturated ground resulting from flooding and heavy rainfall can cause significant damage to roads and hinder access.

Hope thanked the group for their participation. Discussion following the meeting included recommendations for the group to have some follow up discussion with Jeff Thompson, HazChem Officer and ND Department of Emergency Services.

WASA Meeting Williston, ND

Thursday, Sept 7

<u>Discussion on Technical Hazards</u>

- Transportation: Participants recognized that transportation incidents are somewhat common in Williams County, citing three train derailments in recent years.
- HazMat Release:
    - Recalled incident of propane rail car leaking in the city of Williston only two weeks ago which could have had much more serious impact.
    - Recent train derailment in Yellowstone could have resulted in oil spill having an impact on the water system of Williston

- Cybersecurity: Participants acknowledged that cyber security is big and that attacks are coming from lots of different sources
    - SCADA systems are vulnerable to cyber-attacks. Discussion included recollection of an attack that happened on the East Coast that shut down gas supply to businesses and citizens.
    - The local hospital representative discussed the significant impact of cyber-attack on the healthcare system which result in two weeks of alternative documentation processes and increased the wait times in the Emergency Room.
    - Participants acknowledged the impact and concern of loss of electricity due to hacking or vandalism to substations.
        - Impacts water systems and pump stations
        - Personal impacts of loss of heat and cooling
- Flooding: Failure of Fort Peck Dam in Montana was closely monitored by Emergency Management as it could have resulted in three to four feet of water in Williston.

<u>Discussion on Natural Hazards</u>

- Snow & Ice:
    - Along with the freeze/thaw cycles causes frost blows and pot holes that cause costly damage to roads and axel damage to vehicles
    - Roads get shut down causing a significant economic impact to oil companies and their support companies when oil wells are shut down
    - Safety concerns around increased motor vehicle accidents as well as slips, trips, and falls.
- Pest Infestations: Are currently seeing an increase in pest impacting the agriculture industry (grasshoppers).
- Drought:
    - An incident in Wyoming demonstrates the cascading events that may result from drought
        - Fires caused by dry conditions and flares containing liquid gas
        - Dust that causes visibility issues similar to blizzard conditions resulting in increased time for transportation of products, increased risk of MVA
- Wind:
    - High profile vehicles can be blown off the road and/or overturned.
    - Damage to buildings, which could be mitigated through building codes

- Earthquakes:
    - H2S versus fracking. Participants believe earthquakes not caused from fracking and thus the risk in this area is not increased from what the natural risk is.

<u>Mitigation Plan Rankings:</u>

- The Williams County Mitigation planning team
    - Added Cyber Attack to it plan
    - Moved Communicable disease of low priority to medium priority ranking.

Mitigation Ideas:

- Training
- Building Codes. The challenge is enforcement, as Williams County is currently using ICC 2020 Codes.

One participant requested information on personal preparedness which resulted in the Williams County Emergency Manager explain the resources he has available and will share with the requesting party and anyone else.

What hazards are most concerning to you and your community?

- Transportation incident or impacted travel for emergency medical services
- Cyberattack
    - Electricity – Berthold – small community
- Communication before, during, and after incident – population that doesn't read English well, communication issues (read and gather information) – relevant to deaf communties.
    - The Center for Persons with Disabilities provides an early hearing screening process – interpreters.

What support methods do you seek in emergency?

- Covid example – alternative ways to get food and transportation, medicines, healthcare for people who have children.
- Some communities can register yourself if you have a disability – working towards making the distro lists more accessible and with a larger outreach.
- Utility companies have priority lists for those who are vulnerable after an outage -may not be able to share lists because of HIPPA.
- NDROADs – used frequently.
- Shelters can be a concern with mental health issues – emotional support animals - issues getting into shelters.
- Disasters can impact direct support professionals – can potentially be unable to make it to personnel they care for during a disaster.
- Self-advocacy groups – emergency call out – calling the 9 parent and consumer organizations that are tapped in and they will disseminate the sounding board out with information.
- Developmental disabilities – know how to get ahold of the populations with HHS
    - Can collaborate with organizations for situational awareness.
- List of key stakeholders – create or find.
- Emergency plan if they had to leave the office and move somewhere else.
- MSU has a system – emergency alert system

What resources do you use?

- Family voices – use regularly.

    - Can hook our organization within
- Conference coming up.

What challenges do you face during a disaster?

- Communication through the neighborhoods
- In general – limited resources – finances – compromised ability to plan and understand.
- Housing program – given resources
- Plain language – offered Chat GPT
- Project B – men's winter refuge (Homeless)

How do you see climate change impacting how you respond to emergencies?

- Resource availability
- Look towards planning for future climate
- Education for more diverse backgrounds – military presence

How can others advocate?

- National network of other state centers – entity reaches out and puts the word through the network on potential needs throughout an emergency.
- Association of University Centers for Disabilities
- People with disabilities are less likely to get surgeries in relation to healthy patients – they are the most vulnerable and sometimes the last on the list
- Make sure there is representation from the disability community – local emergency planning committee – monthly – include in conversation.
- Someone may not visibly show that they have a disability.
- Ask the question - Is there anything that you need?
- City bus can fit – 2 or 3 wheelchairs – Souris basin transportation can fit 6-8 wheelchairs

Personal preparedness measures:

- Renters insurance
- Contacting family members after disaster – disaster plan
- Contact lists.
- Sewer and water emergency properties/locations
- Extra blankets – car chargers – go bags .
- Check and update go bags (example: daughter grew out of her packed emergency shoes)
- Keeping extra footwear and clothing in vehicles
- Cell phone in pocket – car rollover
- Seatbelt cutters – window breakers

Where do people with criminal backgrounds or sex offenders go?

- Contingencies in place

C. Planning Process

C.1 Project Planning Teams Meeting

C.1.1 Agenda

State of North Dakota Enhanced Mitigation Mission Area Operations Plan Update Kick-off Meeting #1
Monday, January 23, 2023, 10:00 a.m.

Meeting Purpose: Provide an overview of our mitigation program; and discuss the timeline and strategies for development of the Enhanced Mitigation Mission Area Operations Plan.

Microsoft Teams meeting
Click here to join the meeting

ITEM	DESCRIPTION	FACILITATORS
1.	Welcome and Introductions	Justin Messner, CFM, Disaster Recovery Chief, NDDES-HLS Carrie Beth Lasley, PhD Senior Planner II, Grants, Resilience and Master Planning, Engineering Services, Atkins Project Co-Lead
2.	Mitigation Matters in ND: Program and Planning Overview	Justin Messner Kathleen Donahue, North Dakota Project Co-Lead & Deputy Planning Chief, NDDES-HLS
3.	Our Vision for Our Enhanced Mitigation MAOP	Kathleen Donahue Hope Brighton, Mitigation Planner, NDDES-HLS
4.	Why Mitigation Matters in North Dakota Video	Eric Jensen, Strategic Communications Chief, and Clint Fleckenstein, Autonomous Systems and Communications Specialist, NDDES
5.	Standard Changes	Carrie Beth, Atkins Staff, Kathleen
6.	Planning Process	Carrie Beth, Atkins Staff
7.	State Hazard Mitigation Team – Composition, Verification	Carrie Beth, Atkins Staff, Kathleen
8.	Project Schedule	Carrie Beth, Atkins Staff
9.	Strategies for Development	Carrie Beth, Atkins Staff
10.	Data Collection	Carrie Beth, Atkins Staff, Kathleen
11.	Next Steps	Carrie Beth, Atkins Staff, Kathleen
12.	Questions/Concerns	Justin Messner

C.1.2 Meeting Notes

Meeting Narrative

Welcome and Introduction

The NDDES met with Atkins virtually on Monday, January 23rd at 11:00AM CST to discuss their vision and goals for updating the North Dakota Enhanced State Hazard Mitigation Plan. Introductions were exchanged from NDDES leadership and the Atkins team Project Manager, Deputy Project Manager, and team members. This will be the first update since the state has achieved their enhanced status.

Kathleen Donahue, Deputy Planning Chief, shared some important considerations to know about North Dakota's mitigation program. ND was the first State in FEMA Region VIII to achieve Enhanced Status and then followed up with achieving Program Administration by State, or PAS, Status. North Dakota has completed 457 projects since 1997, and locally saves $6.54 per $1 invested in mitigation (Lightbody & Fuchs, 2018). To date this saving has translated to $1,873,393,750.26, according to State Hazard Mitigation Officer Todd Joersz (NDDES, 2023).

All parties were aware of FEMA'S recently released guidance and requirements pertaining to state hazard mitigation planning, and North Dakota's plan update would have to adhere to these new planning standards. Some key summarized takeaways of the conversation include:

- Climate change and equity are topics that need clearly defined and addressed sections
    - ND has partnered with Retired Meteorologist Greg Gust to assist with the climate change section
- State has good information on location, extent, frequency, and duration but
    - Looking to add climate change to each of these
- Climate change also impacts the technological and adversarial threats, too
    - For example, protests

The NDDES team briefed Atkins on feedback provided from their last plan update and approval that was provided from FEMA Region VIII. The Mitigation Strategy, diversifying and adding non-typical partners, and more information on dam hazards were all discussed topics.

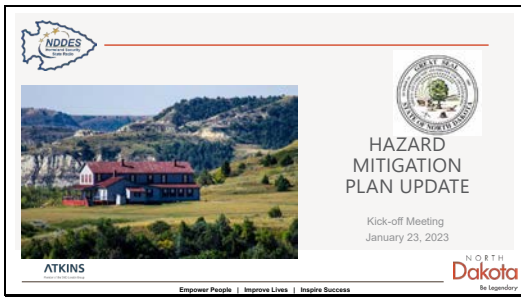
The Atkins teams made several suggestions and collectively agreed on a project schedule moving forward. Risk Assessments would assign committees each led by and composed of subject matter experts to go through hazards individually. Capability Assessments and Risk Assessments would be given individualized attention and working focus. The NDDES staff were receptive to new approaches, including trying new engagement strategies for the public outreach campaign and reformatting how the state builds and presents their mitigation actions.

Conclusion

A project kickoff meeting was to be scheduled in February to officially launch the plan update. NDDES would follow up with date/time and would need to ensure the necessary agencies and representation would be invited to participate in the project and specifically the hazard committees. The target completion date for the plan is October 2023.

C.1.3 Slide Deck

Slide 1



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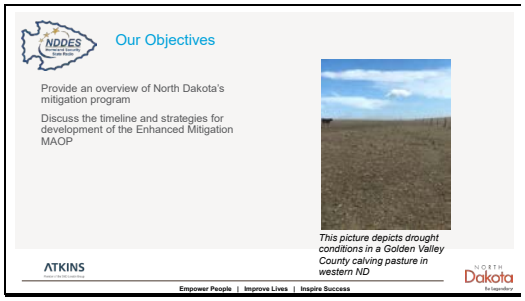

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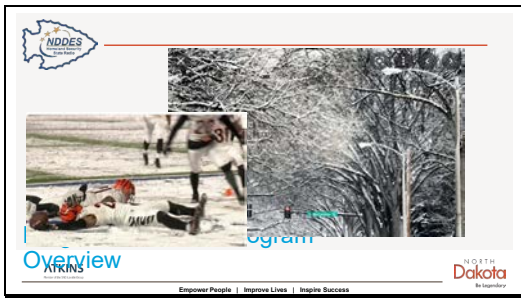

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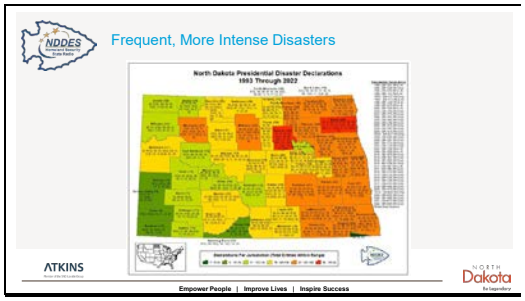

Slide 6

Program Administration by State

North Dakota Achieved Program Administration by State for:

- Hazard Mitigation Program Administration
- Plan Review

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Slide 7

Mitigation Program Highlights

North Dakota uses a data-informed, creative problem-solving approach to mitigation:

- 457 Projects since 1997
- Cost -- $286,451,643.77

Pew Charitable Trust:

- North Dakota saves $6.54 per $1 invested in mitigation
- This savings translates into $1,873,393,750.26

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Slide 8

Mitigation Planning in ND

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Slide 9

Guidance for Local-Tribal Planning Teams

Hazard Mitigation Plan Developers Meetings

April 19, 2023, Enactment of Local, State Mitigation Planning Policies Looms

Working on climate change guidance for our local and tribal mitigation teams

Working on equity issues – potential partnership with NDSU Center for Social Research

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Slide 10

An Active SHMT

State Hazard Mitigation Team

Engaged partners representing 84 organizations

14 hazard and threat committees

A diverse climate change committee

Committee chairs lead risk assessment meetings with their groups during plan updates

Depth on the bench needed for equity, land use

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Slide 11

Annual Reports

Spotlighting:

Partnerships and Integration

Smart, Efficient Infrastructure

Resilience in a Changing Environment

Progress on Mitigation Actions

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Slide 12

Slide 13

Slide 14

Slide 15

Our Vision for the State Mitigation Plan

An empowered State Hazard Mitigation Team
A more data driven, analytical plan
Equity – All Inclusive Plans
Showcase Integration Planning Efforts

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Slide 16

Our Vision for the State Mitigation Plan

Improvements such as:
More analytical vulnerability analyses
Alignment with EMAP standards
Stronger risk assessment conclusions
Increased focus on resilience
Viable mitigation actions

Improvements Already Underway!

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Climate Change in North Dakota

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Finding the Right Resources

New Addition to Our Staff:

Greg Gust, Retired Warning and Meteorologist with the Grand Forks NWS Office

Tasked with:

Developing local-tribal mitigation climate change planning guidance

Writing the climate change chapter of our mitigation plan in collaboration with Atkins, Climate Change Committee

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Current Analysis

Climate Change

According to the 2014 National Climate Assessment, the Northern Plains, including North Dakota, will remain vulnerable to periodic drought because much of the projected increase in precipitation is expected to occur in the cooler months while increasing temperatures will result in additional evapotranspiration during the summer months. The warming trend observed in North Dakota is expected to continue, which may contribute to an increase in the frequency and intensity of drought in the state. These projected changes can exacerbate drought impacts on vulnerable water users in the state, including agriculture, industry, and municipal users. State water supply systems in areas with a higher number of previous drought occurrences will likely continue to experience the highest risk from drought in the future. Additionally, climate change may cause these droughts to be more frequent and intense, which could increase the amount of losses resulting from drought.

The following Table 3.7.5-6 presents the best available data relating to the impacts of climate changes on future droughts. The important summary of these changes is that the state should expect an increased risk from droughts in the future.

Table 3.7.5-6 Expected Changes to Drought Future Condition

Condition	Projected Change
Location	Droughts are a threat throughout the state. Location is not projected to change.
Extent / Intensity	Droughts are projected to increase in extent and intensity.
Frequency	Droughts are projected to increase in frequency due to shifts in seasonal precipitation patterns, including drier summers and less precipitation falling as snow in early spring/fall.
Duration	Droughts are projected to have a longer duration due to shifts in seasonal precipitation patterns, including drier summers and less precipitation falling as snow in early spring/late fall.

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Revised Baseline Assessment

A Few Highlights from the Baseline Climate Change Assessment:

Increases in heavy precipitation could jeopardize the integrity of our aging dams

Droughts are projected to have a longer duration

Increases in temperatures and frequency of droughts translates into an increase in frequency of wildland fires

Heavy to extreme precipitation events are projected to increase the frequency of flood events

Intense storms could contribute to an increased frequency of landslides

Doubling the amount greenhouse gases will lead to greater available energy for thunderstorm development

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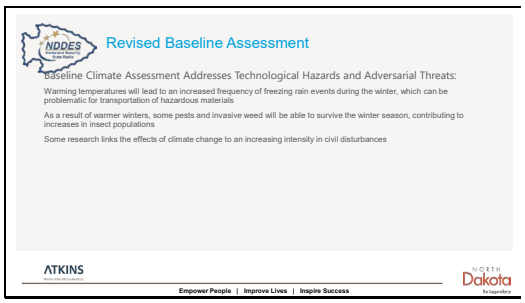

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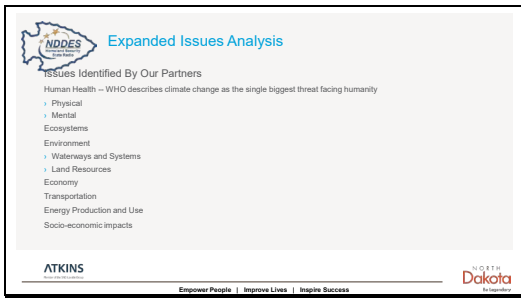

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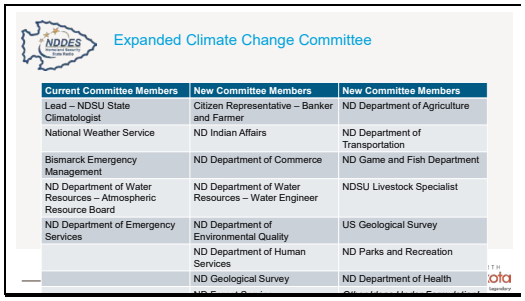

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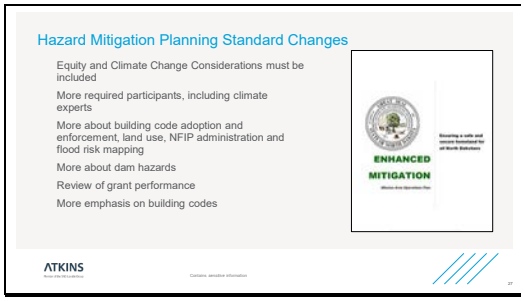

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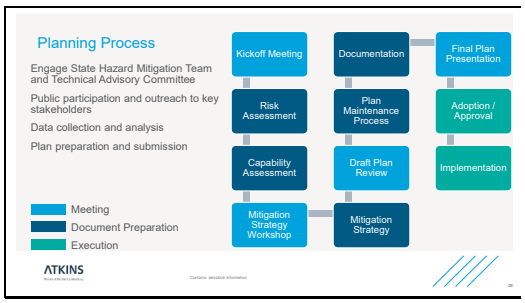

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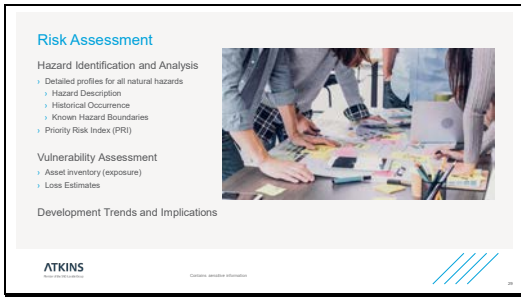

Slide 29

Slide 30

Capability Assessment

Measure capability to implement hazard mitigation activities

Identify and target gaps, conflicts and opportunities with existing local plans, programs, policies, etc.

Identify mitigation measures already in place or underway

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Mitigation Strategy

Mitigation Goals

- Based upon findings of the risk and capability assessments

Identification and analysis of mitigation measures

- Prevention, property protection, natural resource protection, structural projects, emergency services, and public education and awareness

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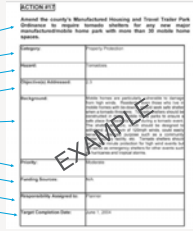
Mitigation Action Plan

- Action
- Category
- Hazard
- Objective(s) Addressed
- Background
- Priority
- Funding Source(s)
- Responsibility
- Completion Date



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Mitigation Action Plan

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Plan Maintenance

Monitoring and Reporting

Evaluating and Updating

Implementation Mechanisms

Continued Public Involvement

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Hazard Mitigation Team

Technical Advisory Committee

- NDDES
- NOAA-NWS
- NDDHS
- NDDOT
- NDEMA/Ward County
- ND State Water Commission

State Hazard Mitigation Team

- State Partners
- Federal Partners
- Local Partners
- Non-Governmental Organizations and Private Partners

Atkins Team

- Carrie Beth Lasley
- Margaret Walton
- Alex Burke
- Erin Capps

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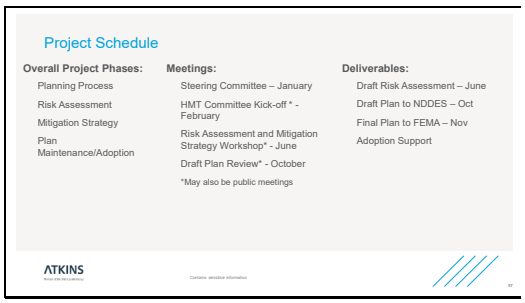

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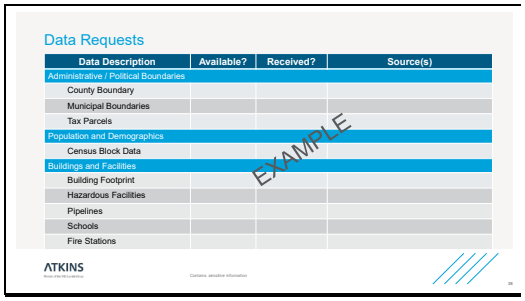

Slide 38

Slide 39

Next Steps

Hazard Mitigation Team Kick-off Meeting
- February 2023

Initiate Data Collection Efforts
- Risk Assessment
- Capability Assessment

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Slide 40

Questions/Concerns

Carrie Beth Lasley, Project Manager
Carrie.Lasley@atkinsglobal.com
502.645.0421

Margaret Walton
Margaret.Walton@atkinsglobal.com
803.622.4142

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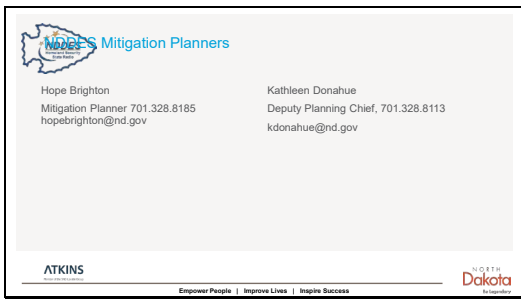
A global fully integrated professional services and project management company

February 23, 2023

Slide 42



Slide 43

C.1.4 Attendance

Initial Kick-off Meeting-January 23, 2023, 10:00am

Name	Dept/Org	Phone Number	Email Address
Alexander Burke	Atkins		Alexander.burke@atkinsrealis.com
Brenda Vossler	NDDES		blvossler@nd.gov
Carl Meyer	NDDES		carlmeyer@nd.gov
Carrie Beth Lasley	Atkins		Carrie.lasley@atkinsrealis.com
Clint Fleckenstein	NDDES		clintfleckenstein@nd.gov
Eric Jensen	NDDES		ericjensen@nd.gov
Eric Upton	NDDES		eupton@nd.gov
Erin Capps	Atkins		Erin.Capps@atkinsrealis.com
Hope Brighton	NDDES		hopebrighton@nd.gov
Jason Stanley	NDDES		jestanley@nd.gov
Justin Messner	NDDES		jmessner@nd.gov
Kathleen Donahue	NDDES		kdonahue@nd.gov

Katie Leitch	NDDES		katieleitch@nd.gov
Margaret Walton	Atkins		Margaret.Walton@atkinsrealis.com
Todd Joersz	NDDES		tjoersz@nd.gov

C.2 TAC Meeting

C.2.1 Invitation

-----Original Appointment-----
From: Donahue, Kathleen B. <kdonahue@nd.gov>
Sent: Tuesday, January 24, 2023 6:13 PM
To: Donahue, Kathleen B.; hope Brighton; Messner, Justin P.; Joersz, Todd W.; Jensen, Eric; Kessel, Shawn; Darr, Brad W.; Ackerman, Laura C.; Fleckenstein, Clint; Lasley, Carrie; Walton, Margaret M
Subject: Mitigation Matters Video -- Technical Advisory Committee
When: Tuesday, January 31, 2023 8:30 AM-9:00 AM (UTC-06:00) Central Time (US & Canada).
Where: Microsoft Teams Meeting

Hello Technical Advisory Committee members and fellow mitigators:

We are soon going to kick off our state enhanced mitigation planning process. We signed a contract with Atkins; many of the staff at Atkins are familiar with us and have been working on planning projects and benefit cost analyses. Carrie Beth Lasley and Margaret Walton bring a lot of great experience to the project.

For our first meeting of the State Hazard Mitigation Committee, we thought it would be great if we could tell the story of mitigation to underscore the importance of our members' contributions. We have a great team onboard at NDDES to develop a video – Clint Fleckenstein and Eric Jensen.

Basically, we want to know from each of you why mitigation matters to you. Here are some jumping-off points; we can refine them during our meeting. Please feel free to change these suggestions:

- Miranda Schuler, Minot resident and former Minot City Commissioner who experienced flooding in Minot and also saw the enactment of mitigation actions. Also sells flood insurance. We will talk with Miranda when she is back in town later next week.
- Todd Joersz, ND Department of Health and Human Services, discussing what hazard mitigation is and why it is important to our state.
- Russ Korzeniewski, ND Health and Human Services, xxxxxxxxx, discussing how emergency management, and mitigation in particular, is about people
- Justin Messner, ND Department of Emergency Services, @xxxxxxxxx, discussing our program and what we have achieved
- Laura Ackerman, ND Department of Water Resources, @xxxxxxxxx, discussing the Bi-National Souris Basin study
- Brad Darr, ND Department of Transportation, @xxxxxxxxx, talking about how NDDOT is working with partners through its planning efforts to incorporate mitigation
- Hope Brighton, NDDES, @xxxxxxxxx, discussing new initiatives on the horizon, such as climate change and equity

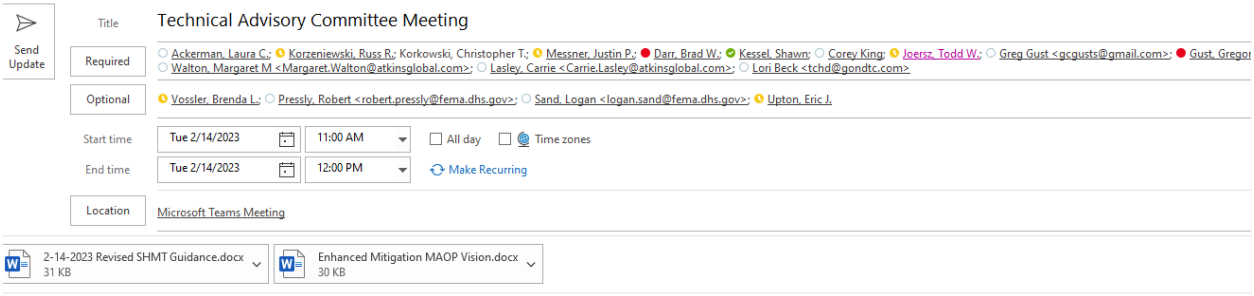
- Kathleen Donahue, NDDES, @xxxxxxxxx, talking about the Power of Collaboration.

While the video will be relatively short, Clint and Eric have some excellent ideas too on how to use expanded interviews for social media.

Thank you!

C.3 TAC Meeting

C.3.1 Agenda



Thank you for agreeing to help set the direction for our State Hazard Mitigation Team. In advance of our kickoff meeting at 9 a.m. February 28, the NDDES crew wants to meet with the Technical Advisory Committee on 11 a.m. February 14 to have an informal conversation as follows:

1) Meet Carrie Beth Lasley and Margaret Walton of Atkins, the contracting firm selected to update our Enhanced mitigation plan
2) Discuss roles and responsibilities of the State Hazard Mitigation Team
3) Receive your insights as we map out the vision for the State Mitigation Plan
4) Discuss plans for the Upcoming February 28th meeting

I will be sending information soon in advance of our February 14 meeting.

Thank you for all the support.

Kathleen

C.3.2 Attendance

Risk Assessment Meeting-June 21, 2023, 9:00am

Name	Dept/Org	Phone Number	Email Address
Alexander Burke	Atkins		Alexander.burke@atkinsrealis.com
Brenda Vossler	NDDES		blvossler@nd.gov
Laura Ackerman	NDDWR		lcackerman@nd.gov
Carrie Beth Lasley	Atkins		Carrie.lasley@atkinsrealis.com
Russ Korzeniewski	ND DHHS		rkorzeniewski@nd.gov
Christopher Korkowski	ND DWR		ckorkowski@nd.gov
Eric Upton	NDDES		eupton@nd.gov
Brad Darr	ND DOT		bdarr@nd.gov
Hope Brighton	NDDES		hopebrighton@nd.gov
Shawn Kessel	ND Commerce		skessel@nd.gov
Justin Messner	NDDES		jmessner@nd.gov
Kathleen Donahue	NDDES		kdonahue@nd.gov

Name	Dept/Org		Email Address
Corey King	NOAA NWS		corey.king@noaa.gov
Margaret Walton	Atkins		Margaret.Walton@atkinsrealis.com
Todd Joersz	NDDES		tjoersz@nd.gov
Greg Gust	NDDES		ggust@nd.gov
Lori Beck	NDSU		tchd@gondtc.com
Rob Pressly	FEMA Region VIII		robert.pressly@fema.dhs.gov
Logan Sand	FEMA Region VIII		logan.sand@fema.dhs.gov

C.3.3 Enhanced MAOP and SHMT Guidance

Overview of the Vision for the Enhanced Mitigation Mission Area Operations Plan

REVISED: February 14, 2023

The North Dakota State Hazard Mitigation Team plans to build on the state's successful history of mitigation planning and program implementation by ensuring:

- A SHMT empowered with the right resources to analyze adversarial threats and natural and technological hazards; and to determine the direction of a data informed state mitigation strategy;
- Stronger risk assessments that delve more fully into risk and vulnerability and offer a roadmap for selecting viable and achievable mitigation actions;
- A more comprehensive climate change analysis that examines health, ecosystems, environmental, economic, transportation, energy production, and sociological impacts;
- A planning effort that gives an equitable voice to all sectors of our population; and
- An emphasis on developing strong communities prepared to address the impacts of the state's hazards and threats.

Overview of the State Mitigation Planning Process

REVISED: February 14, 2023

Purpose

This guidance memo provides the State Hazard Mitigation Team (SHMT) with an overview of the process for developing the *State of North Dakota's Enhanced Mitigation Mission Area Operations Plan (Enhanced Mitigation MAOP)*, which serves as the foundation for the statewide hazard mitigation program.

Why Mitigation Matters in North Dakota

Our SHMT helps build a more disaster resilient North Dakota by making mitigation a priority. Mitigation is any sustained action taken to reduce or eliminate the long-term risk to people, property and the environment. In North Dakota, mitigation actions translate into a savings of $6.54 per dollar (source: Pew Charitable Trust). Using that formula, hazard mitigation projects in North Dakota have prevented more than **$1.8 billion** in disaster damages. *Bottom line: Mitigation works to protect our most valued resource, people.*

Foundation for the State's Mitigation Strategy

The *Enhanced Mitigation MAOP* serves as a roadmap for building a more resilient North Dakota as follows:

- Identifying hazards and threats;
- Analyzing risk and vulnerability to these hazards and threats;

- Identifying resources and capability gaps to mitigate against these hazards and threats; and
- Outlining strategies to build safer, more disaster-resilient communities.

Mitigation plans are updated every five years and are a requirement to receive federal disaster dollars. FEMA establishes federal mitigation planning requirements for local, tribal and state mitigation plans. North Dakota received Enhanced Mitigation Plan status in 2019, a reflection of the state's proven commitment to hazard mitigation.

Hazards and Threats

While federal mitigation planning regulations only address natural hazards (such as flood and drought), the SHMT has expanded the focus to include technological hazards (such as dam failure and hazardous material releases) and adversarial threats (such as cyberattack and civil disturbance). Subject to change by the 2023 SHMT, North Dakota's hazards and threats were ranked in 2018 in order of most concerning:

#	Hazard/Threat	#	Hazard/Threat
1	Cyber Attack	8	Hazardous Materials
2	Flood	9	Space Weather
3	Severe Winter Weather	10	Dam Failure
4	Severe Summer Weather	11	Criminal, Terrorist or Nation-State Attack
5	Fire	12	Geologic Hazards
6	Infectious Diseases & Pest Infestations	13	Civil Disturbance
7	Drought	14	Transportation Incident

SHMT Objectives

The SHMT is comprised of more than 80 local, tribal, state, federal, non-governmental and private organizations with authorities, responsibilities and/or expertise required to ensure North Dakota's resiliency to adversarial threats and natural and technological hazards.

The SHMT objectives are as follows:

- Increase North Dakota's disaster resiliency by developing and maintaining an effective statewide hazard mitigation program that is supported by all levels of government, non-governmental organizations and the private sector.
- Promote hazard mitigation efforts to reduce loss of life, and damages to property and the environment, by lessening the impact of disasters.
- Ensure North Dakota's continued eligibility for federal disaster recovery dollars.
- Contribute expertise for development of the *Enhanced Mitigation MAOP,* which serves as the foundation for enactment of North Dakota's statewide mitigation program.

Roles and Responsibilities

The North Dakota Department of Emergency Services (NDDES) has selected Atkins Global to develop the 2024 Enhanced MAOP. NDDES has oversight for development, implementation and maintenance of the plan. SHMT members provide data and technical expertise based on the scope of their organizations, which will help identify viable mitigation actions to counteract the impacts of hazards and threats.

SHMT Organizational Structure

The SHMT is comprised of a Technical Advisory Committee, Hazard- and Threat-Specific Committees and Planning Committees.

Technical Advisory Committee (TAC)

The TAC establishes the vision and the goals for the Enhanced Mitigation MAOP. TAC membership includes representation of the following organizations:

- N.D. Department of Commerce (NDDoC)
- N.D. Department of Emergency Services (NDDES)
- N.D. Emergency Management Association (NDEMA)
- N.D. Department of Health and Human Services (NDHHS)
- N.D. Department of Transportation (NDDOT)
- N.D. Department of Water Resources (DWR)
- National Oceanic and Atmospheric Administration (NOAA) National Weather Service (NWS)
- Federal Emergency Management Agency Region VIII

Hazard and Threat Committees

The primary duties of the hazard and threat committees include data collection and then review of assigned hazard and threat profiles. Based on the review, team members work collectively to identify potential mitigation actions.

Current Hazard and Threat Committees

Pending Review by the SHMT:

Adversarial Threats (Civil Disturbance; Criminal, Terrorist or Nation-State Attack; Cyber Attack)

Dam Failure

Drought

Fire

Flood

Geologic Hazards

Hazardous Materials

Infectious Diseases and Pest Infestation

Severe Summer Weather

Severe Winter Weather

Space Weather

Transportation Incident

C.4 SHMT Kickoff Meeting

C.4.1 Agenda

State of North Dakota Enhanced Mitigation Kick-off Meeting
February 28, 2023, 9:00 a.m.

Meeting Purpose: Discuss why mitigation matters and the role of the State Hazard Mitigation Team; outline the timeline and strategies for development of the Enhanced Mitigation Mission Area Operations Plan; and identify hazards and threats that have the potential to adversely impact North Dakota and its citizens.

Microsoft Teams meeting

Click here to join the meeting

ITEM	DESCRIPTION	PRESENTERS
1.	Welcome	Justin Messner, CFM, Disaster Recovery Chief, NDDES-HLS Carrie Beth Lasley, PhD, Senior Planner II, Grants, Resilience and Master Planning, Engineering Services, Atkins Project Co-Lead
2.	Why Mitigation Matters in North Dakota	Eric Jensen, Strategic Communications Chief, NDDES Clint Fleckenstein, Autonomous Systems and Communications Specialist, NDDES
3.	Our Mitigation Journey	Todd Joersz, State Hazard Mitigation Officer, NDDES-HLS Kathleen Donahue, ND Project Co-Lead, NDDES-HLS Russ Korzeniewski, Disaster Preparedness Administrator/Risk Manager, ND Department of Health and Human Services Greg Gust, Meteorologist, NDDES
4.	State Hazard Mitigation Team Collaboration	Brad Darr, P.E., State Maintenance Engineer, ND Department of Transportation
5.	Federal Requirement Changes	Rob Pressly, Community Planner, Federal Emergency Management Agency VIII
6.	Objectives and Tasks	Carrie Beth Lasley
7.	What Keeps You Up at Night? Identification of Hazards and Threats	Carrie Beth Lasley and Margaret Walton, CFM, Deputy Project Manager, Atkins
8.	Data Collection	Carrie Beth Lasley, Kathleen Donahue
9.	Project Schedule	Carrie Beth Lasley
10.	Next Steps	Carrie Beth Lasley
11.	Questions/Concerns	Kathleen Donahue

C.4.2 Meeting Notes

Meeting Narrative

The NDDES Enhanced State Hazard Mitigation Plan Update project kickoff meeting was held virtually on February 28th at 9:00 AM. The kickoff meeting was attended by NDDES staff, a variety of other state departments, NDDES's consultant group, Atkins, FEMA Region VIII, many partner agencies, and multiple stakeholders.

Kathleen Donahue and Justin Messner, both of North Dakota Department of Emergency Services, opened the meeting with introductions and warm welcomes for all in attendance. As the lead agency, they provided the high-level background and overview explaining that this meeting was the kickoff to support an update the State's Enhanced Hazard Mitigation Plan. They also reiterated that this was the first update to the plan since becoming an enhanced state. Since North Dakota adopted the State Enhanced Hazard Mitigation Plan, there have been 10 (nine state and one tribal) presidentially declared disasters.

Updating the plan would be an ongoing effort that would span several months and would be supported by Atkins. The Project Manager for Atkins, Carrie Beth Lasley, and the Deputy Project Manager, Margaret Walton introduced their team, outlined the agenda, and began the meeting.

North Dakota's state mitigation program has several strengths. Some that were highlighted during the kickoff meeting included:

Video: ND Mitigation Overview
- Collection of project highlights, endorsements from state officials, and stories featuring positive outcomes from mitigation and planning efforts

Program Administration by State
- ND is approved to administer mitigation programs including plan review and approval, grant application review, benefit cost analysis review, grant management and fiscal management.
- ND saves $6.54 per $1 invested in mitigation, which translates to $1,873,393,750.26 in total savings

Mitigation Plans: Our Roadmap
- Provides an overview of communities and assets at risk
- Identifies hazards and threats
- Analyzes risk and vulnerability presented by hazards and other threats
- Outlines strategies to build safer, more resilient communities
- Every jurisdiction in the state either has an approved plan or a plan currently in review

Ms. Donahue discussed the value and meaning of what it means to be an Enhanced State. The North Dakota Enhanced Mitigation Mission Area Operations Plan not only meets standard state hazard mitigation plan requirements but also meets more stringent enhanced mitigation plan requirements. North Dakota is also a Program Administration by State (PAS) meaning the program has the authority to review and approve local Hazard Mitigation Program Administration and Plan Reviews.

<u>Policy Updates</u>

FEMA Region VIII partners attended the kickoff meeting, and Robert Pressly provided a comprehensive insight to federal updates pertaining to State Mitigation Planning Policy. Mr. Pressly's presentation included the following topics:

- FEMA's official policy on and interpretation of the Code of Federal Regulations 44 CFR Part 201
- Section 201.3: Responsibilities
- Section 201.4: Standard State Requirements
    - Plan for equity and climate change impacts
    - Include representatives from a broad range of sectors
    - Describing building code adoption and enforcement, land use, NFIP, and flood risk mapping in the capability assessment
- Section 201.5: Enhanced State Requirements
    - Requires the state demonstrate local jurisdictions have approved mitigation plans
    - Strongly encourages enhanced states to adopt and enforce building codes that promote resilience
- Planning Process
    - Outlines a planning process with a broad range of state and other partners
    - Must have an agency or department that regulates building codes
    - Climate change experts
    - State agencies and others that support underserved communities
    - Community lifeline stakeholders
- Capability Assessment
    - Clarifies expectations for the evaluation of laws, regulations, and policies in the capability assessment, to include:
    - State land use laws, enabling legislation and plans
    - Adoption/ enforcement of building codes
    - State NFIP administration
- Integrated Planning
    - The plan must demonstrate how state mitigation plan risk information, goals, strategies, and actions have been integrated into other state and/or regional plans, programs, policies, initiatives, and procedures, as well as results or outcomes of this activity
- Demonstrating commitment to a comprehensive program
    - Statewide laws and frameworks
    - Cross-state partnerships focused on mitigation investment
    - Multi-year planning for risk reduction
    - Model floodplain management ordinances that go beyond NFIP minimum
    - Training and capability building
    - Showing that at least 75% of all its local jurisdictions have previously submitted a mitigation plan and are currently approving or updating their plans
- The state is strongly encouraged to demonstrate its commitment to mitigation by adopting and enforcing building codes that enhance resilience
- The state must demonstrate the full and effective use on non-FEMA programs
    - (EDA, HUD, DOA, DOI – USFS)

<u>Planning Process</u>

For the planning process, Ms. Lasley provided the team with an outline of the plan and how the hazards and threats would be organized and assessed. Ms. Lasley discussed the recently completed Space

Weather Annex that had been published for the State's current plan. Ms. Lasley discussed that different tasks and objectives will occur during the lifespan of the plan development, and the team could expect the general following process:

- Kickoff Meeting
- Risk Assessment
- Capability Assessment
- Mitigation Strategy Workshop
- Mitigation Strategy
- Draft Plan Review
- Plan Maintenance Process
- Documentation
- Final Plan Presentation
- Adoption/Approval
- Implementation

Risk Assessment

After giving a preview of the project schedule and the different section milestones, Ms. Lasley detailed the risk assessment. She explained hazards and threats would be categorized as natural hazards, technological, or adversarial threats, and each hazard would have a detailed, North Dakota centric profile that aligns with the EMAP standards. The State identifies 14 total hazards as follows:

Natural Hazards	**Technological Hazards**	**Adversarial Hazards**
Flood	Dam Failure	Cyber Attack
Severe Summer Weather	Space Weather	Civil Disturbance
Severe Winter Weather	Hazardous Materials Release	Criminal, Terrorist, or Nation-State Attack
Drought	Transportation Incident	
Geologic Hazards		
Wildfire/Urban Fire		
Infectious diseases		

Each hazard will have a committee formed with subject matter experts to provide insight, data, and guide the discussion and reporting of the hazard profile. Each committee will meet at least twice and will review their respective hazard profile section and provide comments as part of the update process. Hazard committee members will be critical in providing capability assessments and fulfilling data requests made by Atkins.

Specific talking points pertaining to hazards for this plan update provided during the kickoff meeting included:

- Infectious Disease and Pest Infestation should be moved from Adversarial Threats to Natural Hazards
- Dust storms and high winds can be folded into Severe Summer Weather
- Should utility outages be their own hazard, or a cascading effect of other hazards?
- Shortages and outage of critical materials is a topic that needs to be discussed within the hazards

Ms. Donahue explained the importance of adding climate change and the impacts to each applicable hazard during this plan update. She introduced Greg Gust, retired State Meteorologist, and explained his lead role in overlapping with each hazard committee to spearhead the climate change portion. Greg presented to the project team a synopsis of climate change for North Dakota. The most crucial takeaways from his presentation are:

- The draft 5th National Climate Assessment, is currently in final revision and agency reviews will inform our climate strategy
- Drought and flood are expected to increase in frequency and duration
- Temperature increases and frequency of droughts translates into an increase in frequency of wildland fires
- Increasing heavy precipitation could jeopardize the integrity of the State's aging dams
- Heavy to extreme precipitation events are projected to increase the frequency of flood events, especially in eastern portions of the state
- Baseline Climate Assessment addresses technological hazards and adversarial threats
- Plan update will feature an expanded issue analysis related to climate

Adding climate change information in sufficient detail for the first time will be a significant effort, and therefore Ms. Donahue was happy to report the climate change committee was expanded in number.

Conclusion

Ms. Donahue concluded the meeting with special thanks to all for attending and reiterated the upcoming project schedule, hazard committee meeting schedule and commitments, and goals and objectives of the plan update before adjourning the meeting. A reminder to all for why mitigation is so important for all in ND, ND saves $6.54 per $1 invested in mitigation, which translates to $1,873,393,750.26 in total savings.

C.4.3 Slide Deck

Slide 1

ENHANCED MITIGATION MAOP UPDATE KICK-OFF MEETING

February 28, 2023

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Slide 2

Welcome

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Slide 3

Meeting Sign-in

We appreciate your attendance and want to have a record of it so please sign-in on this form:

https://forms.gle/mMkTuVEQrj2gHpTW6

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Slide 4

Poll Question

- How many federally declared disasters have occurred since the last update of the state's enhanced mitigation plan?

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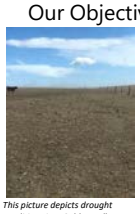
Slide 5

Our Objectives

- Discuss our "Mitigation Journey"
  - What we have accomplished
  - Where we are headed
- Understand our roles and responsibilities
  - Data Collection
  - Review of Written Materials
- Outline the timeline and strategies for development of the Enhanced Mitigation MAOP
- Identify hazards and threats impacting North Dakotans



This picture depicts drought conditions in a Golden Valley County calving pasture in western ND

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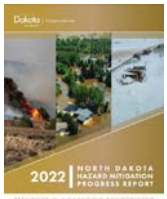
Slide 6



Our Mitigation Journey

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Slide 7

Poll Question

- How often do you think about hazard mitigation in your current role?

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Slide 8

Poll Question

- Have you considered hazard mitigation as a whole or mitigation actions in other plans and projects?

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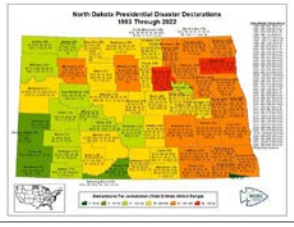
Slide 9

Frequent, More Intense Disasters



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Slide 10

Hazard Mitigation

- Definition – Any sustained action taken to reduce or eliminate long-term risk to people and property from natural hazards and their effects. – Unified Hazard Mitigation Assistance Guidance.
- Breaks the cycle of damages
- Promotes community resilience
- Reduces the risk to human life and safety

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Slide 11

Program Administration by State

North Dakota Achieved Program Administration by State for:

- Hazard Mitigation Program Administration
- Plan Review

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Slide 12

Mitigation Program Highlights

North Dakota uses a data-informed, creative problem-solving approach to mitigation:
- 457 Projects since 1997
- Cost -- $286,451,643.77

Pew Charitable Trust:
- North Dakota saves $6.54 per $1 invested in mitigation
- This savings translates into $1,873,393,750.26

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Slide 13

Mitigation Plans: Our Roadmap

- Provides an overview of communities and assets at risk
- Identifies hazards and threats
- Analyzes risk and vulnerability presented by hazards and threats
- Outlines strategies to build safer, more resilient communities

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Slide 14

Local/Tribal Mitigation Plans

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Slide 15

Guidance for Local-Tribal Planning Teams

- Hazard mitigation plan developers' meetings
- April 19, 2023, enactment of Local, State Mitigation Planning Policies Looms
  - Working on climate change guidance for our local and tribal mitigation teams
  - Working on equity issues – NDSU Center for Social Research, ND Department of Commerce

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Slide 16

State Enhanced Plan Status

- Our Enhanced Mitigation Mission Area Operations Plan meets:
  - Standard State Hazard Mitigation Plan Requirements AND
  - More Stringent Enhanced Mitigation Plan Requirements
    - Entitles ND to 20 percent of the total estimated eligible Stafford Act disaster assistance versus 15 percent with standard plans
    - Requires a solid grant management track record
    - Demonstrates integration of planning efforts
    - Examines climate change and its impact

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Slide 17

Our Vision for the State Mitigation Plan

- A State Hazard Mitigation Team (SHMT) empowered with right resources to:
  - Analyze hazards and threats
  - Determine the direction of a comprehensive and data-informed state mitigation strategy

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Slide 18

Our Vision for the State Mitigation Plan

- Stronger risk assessments that delve more fully into risk and vulnerability and offer a roadmap for:
  - Mitigation Actions
  - Mitigation Adaptation Actions
  - Mitigation Investments
- FEMA's emphasis is a strong mitigation strategy predicated on a solid risk assessment.
  - Once risk assessments are reviewed, it will be critical for all of us to review drafts of mitigation and adaptation actions

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Slide 19

Our Vision for the State Mitigation Plan

- Comprehensive Climate Change Analysis
- Integrated risk reduction and resilience planning
- Effective dissemination of plan information and participation opportunities
- Equitable voice to all sectors
- Developing resilient communities

Welcome to the Atkins Team – Bringing a Wealth of Experience

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Slide 20

SHMT Success Stories

- Captured in annual reports
  - Partnerships and integration
  - Smart, Efficient Infrastructure
  - Resilience in a Changing Environment
  - Progress on Mitigation Actions

https://www.des.nd.gov/planning

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Slide 21

Engage the Public in Mitigation

Community Coffees Audiences Include:

- Youth
- Seniors
- LGBTQIA+
- Homeless Individuals
- College Students
- New Americans, Foreign Born and Immigrants
- First Responders and more…

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Emphasize Integration Efforts

We traveled many miles, still more to go:

- Mouse/Souris River Binational Study
- North Dakota Department of Transportation plans
- Main Street Initiative

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Slide 23

Climate Change in North Dakota

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Slide 24

Finding the Right Resources

New Addition to the NDDDES Staff:

- Greg Gust, *Recently Retired* Warning Coordination Meteorologist with the Grand Forks NWS Office
- Tasked with:
  - Developing local-tribal mitigation climate change planning guidance
  - Writing the climate change chapter of our mitigation plan in collaboration with Atkins, Climate Change Committee

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Finding the Right Resources

Previous Experience: Working with the Central North Dakota *Climate Change Scenario Planning Workshop*, Held November 12-13, 2015, Bismarck ND. https://pubs.er.usgs.gov/publication/70176346

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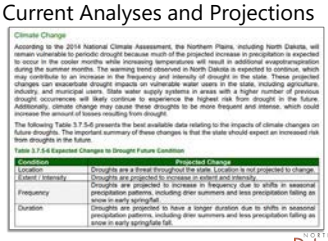
Current Analyses and Projections

The *draft* 5th National Climate Assessment, NCA5, is currently in final revision and agency reviews.

- Due out this Fall!
- Both Trends and Projections remain similar.



Climate Change

According to the 2014 National Climate Assessment, the Northern Plains, including North Dakota, will remain vulnerable to periodic drought because much of the projected increase in precipitation is expected to occur in the cooler months while increasing temperatures will result in additional evapotranspiration during the summer months. The warming trend observed in North Dakota is expected to continue, which may contribute to an increase in the frequency and intensity of drought in the state. These projected changes can exacerbate drought impacts on vulnerable water users in the state, including agriculture, industry, and municipal users. State water supply systems in areas with a higher number of previous drought occurrences will likely continue to experience the highest risk from drought in the future. Additionally, climate change may cause these droughts to be more frequent and intense, which could increase the amount of losses resulting from drought.

The following Table 3.7.5-6 presents the best available data relating to the impacts of climate changes on future droughts. The important summary of these changes is that the state should expect an increased risk from droughts in the future.

Table 3.7.5-6 Expected Changes to Drought Future Condition

Condition	Projected Change
Location	Droughts are a threat throughout the state. Location is not projected to change.
Extent / Intensity	Droughts are projected to increase in extent and intensity.
Frequency	Droughts are projected to increase in frequency due to shifts in seasonal precipitation patterns, including drier summers and less precipitation falling as snow in early spring/fall.
Duration	Droughts are projected to have a longer duration due to shifts in seasonal precipitation patterns, including drier summers and less precipitation falling as snow in early spring/late fall.

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Revised Baseline Assessment

- Some Highlights from the Baseline Climate Change Assessment for North Dakota - Drought and Flood:
  - **Droughts** are projected to increase in frequency and duration
  - Increases in temperatures and frequency of droughts translates into an increase in frequency of **wildland fires**
  - Doubling the amount of greenhouse gases will lead to greater available energy for **thunderstorm** development
  - Increases in **heavy precipitation** could jeopardize the integrity of our aging dams
  - Heavy to extreme precipitation events are projected to increase the frequency of **flood** events, especially in eastern portions of the state
  - More intense storms could contribute to an increased frequency of **soil erosion** and landslides

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Revised Baseline Assessment

- Baseline Climate Assessment Addresses Technological Hazards and Adversarial Threats:
  - **Warming winter** temperatures will lead to **more freezing rain** which can impact energy transmission, communications, and the transportation of hazardous materials
  - As a result of warmer winters, **more pests** and **invasive weeds** will be able to survive the winter season, contributing to increases in insect populations
  - Some research links the effects of climate change to an increasing intensity in civil disturbances
  - Indigenous communities could experience growing season shifts and **species migration** that may threaten the availability of traditional foods, medicine, and plants

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Expanded Issues Analysis

- Issues Identified By Our Partners
  - Human Health -- WHO describes climate change as the single biggest threat facing humanity
    - Physical
    - Mental
  - Ecosystems… changing crops, rangeland impacts, loss of indigenous plants
  - Environment
    - Waterways and Systems
    - Land Resources
  - Economy
  - Transportation
  - Energy Production and Use
  - Socio-economic impacts
    - Underserved and/or Vulnerable Populations
    - Rural, Tribal, Low Income, etc.

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Expanded Climate Change Committee

Current Committee Members	New Committee Members	New Committee Members
Lead – NDSU State Climatologist	ND Forest Service	ND Department of Agriculture
National Weather Service	ND Indian Affairs	ND Department of Transportation
Bismarck Emergency Management	ND Department of Commerce	ND Game and Fish Department
ND Department of Water Resources – Atmospheric Resource Board	ND Department of Water Resources – Water Engineer	NDSU Livestock Specialist
ND Department of Emergency Services	ND Department of Environmental Quality	US Geological Survey
	ND Department of Health and Human Services	ND Parks and Recreation
	ND Geological Survey	
	ND Forest Service	*Other Ideas Under Formulation!*

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Team Collaboration

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State Hazard Mitigation Team

Our Objectives:

- Increase our state's resiliency through Whole Community planning
- Promote mitigation efforts
- Ensure North Dakota's continued eligibility for federal disaster recovery dollars
- Contribute expertise to the statewide mitigation strategies.

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The Power of Collaboration

- Atkins and NDDES
  - Responsible for preparing documents for review
- State Hazard Mitigation Team
  - Engaged, diverse partners to provide data, review written materials based on members' areas of expertise
  - Insights help build a strong strategy for helping our fellow citizens
  - Opinions will be essential for the mitigation strategy

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Current Committees

- Technical Advisory Committee – Overall guidance for plan, program development and implementation.
- Hazard and Threat Committees – Provide expertise to analyze hazards and threats and identify mitigation actions to reduce risk.
- Planning Committees – Address issues specific to mitigation planning concerns and program implementation, such as climate change.

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Share Your Insights!

In partnership, we:

- Participate in meetings
- Help identify hazards and threats
- Provide data from your organization
- Review material developed by Atkins, NDDES
- Identify existing and needed capabilities
- Develop mitigation strategies to make North Dakota more resilient

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Slide 36

Objectives and Tasks

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Slide 37

Objectives and Tasks

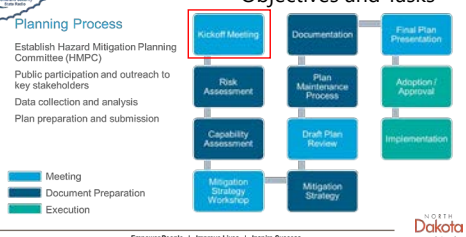
Planning Process

Establish Hazard Mitigation Planning Committee (HMPC)

Public participation and outreach to key stakeholders

Data collection and analysis

Plan preparation and submission



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What Keeps You Up at Night?

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Slide 39

Identification of Hazards and Threats

Natural Hazards	Technological Hazards	Adversarial Threats
▪ Flood	▪ Dam Failure	▪ Cyber Attack
▪ Summer Severe Weather	▪ Space Weather	▪ Civil Disturbance
▪ Winter Severe Weather	▪ Hazardous Materials Release	▪ Criminal, Terrorist or Nation-State Attack
▪ Drought	▪ Transportation Incident	
▪ Geologic Hazards		
▪ Wildfire/Urban Fire		
▪ Infectious Diseases and Pest Infestations		

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Slide 40

Poll Question

- Do you think any of these other hazards should be identified and profiled within the state's enhanced mitigation plan update?

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Identification of Hazards and Threats

Priority Ranking Index (PRI)

PRI Category	Degree of Risk	
	Level	Criteria
Probability	Unlikely	Less than 1% annual probability
	Possible	Between 1 and 10% annual probability
	Likely	Between 10 and 100% annual probability
	Highly Likely	100% annual probability
Impact	Minor	Very few injuries, if any. Only minor property damage and minimal disruption on quality of life. Temporary shutdown of critical facilities.
	Limited	Minor injuries only. More than 10% of property in affected area damaged or destroyed. Complete shutdown of critical facilities for more than one day.
	Critical	Multiple deaths/injuries possible. More than 25% of property in affected area damaged or destroyed. Complete shutdown of critical facilities for more than one week.
	Catastrophic	High number of deaths/injuries possible. More than 50% of property in affected area damaged or destroyed. Complete shutdown of critical facilities for 30 days or more.

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Identification of Hazards and Threats

Priority Ranking Index (PRI)

PRI Category	Degree of Risk	
	Level	Criteria
Spatial Extent	Negligible	Less than 1% of area affected
	Small	Between 1 and 10% of area affected
	Moderate	Between 10 and 50% of area affected
	Large	Between 50 and 100% of area affected
Warning Time	More than 24 hours	Self explanatory
	12 to 24 hours	Self explanatory
	6 to 12 hours	Self explanatory
	Less than 6 hours	Self explanatory
Duration	Less than 6 hours	Self explanatory
	Less than 24 hours	Self explanatory
	Less than one week	Self explanatory
	More than one week	Self explanatory

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Identification of Hazards and Threats

HIGH RISK

MODERATE RISK

LOW RISK

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Identification of Hazards and Threats

Risk Assessment

Hazard Identification and Analysis

- Detailed profiles for all natural hazards
  - Hazard Description
  - Historical Occurrence
  - Known Hazard Boundaries
- Priority Risk Index (PRI)

Vulnerability Assessment

- Asset inventory (exposure)
- Loss Estimates

Development Trends and Implications

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Slide 45

Identification of Hazards and Threats

Enhanced Approach

- Risk Index and Vulnerability Index by County and Hazard
- Consideration of Human Loss, Economic Disruption, Historic and Critical Facilities Impacted, Ecologic, and Social Values
- Hazus Level 1 Analysis for relevant natural hazards
- Description of opportunities and state roles in mitigation activities

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Identification of Hazards and Threats

Capability Assessment

Measure capability to implement hazard mitigation activities

Identify and target gaps, conflicts and opportunities with existing local plans, programs, policies, etc.

Identify mitigation measures already in place or underway

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Slide 47

Data Collection

Data Requests

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Slide 48

Project Schedule

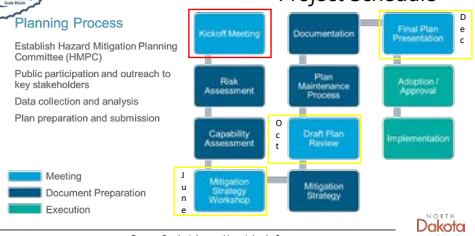
Planning Process

Establish Hazard Mitigation Planning Committee (HMPC)

Public participation and outreach to key stakeholders

Data collection and analysis

Plan preparation and submission



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Next Steps

Hazard Mitigation Committees

Data Collection
- Expect requests from your organization

Capability Assessment
- Expect outreach in late spring

Community Coffee Conversations and more outreach

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Slide 50

- Please do not forget to sign-in:
  https://forms.gle/mMkTuVEQrj2gHpTW6

Questions/Feedback:

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NDDES
Kdonahue@nd.gov

Carrie Beth Lasley, PhD
Project Co-Lead
Atkins
Carrie.Lasley@atkinsglobal.com

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Slide 51

State of North Dakota Enhanced Mitigation Plan

Project Kickoff Meeting - February 28, 2023

Timestamp	Name	Agency/Department	Position	Email Address	Phone number
2/28/2023 11:07	Aaron Carranza	ND Department of Water Resources	Regulatory Division Director	acarranza@nd.gov	
2/28/2023 11:20	Alex Burke	Atkins	Planner II	alexander.burke@atkinsglobal.com	
2/28/2023 12:11	Ali DeMersseman	US Economic Development Administration	EDR	ademersseman@eda.gov	
2/28/2023 11:07	Amanda Bakken	ND Department of Health and Human Services	Epidemiologist	ajbakken@nd.gov	
2/28/2023 11:11	Amanda Lee	NOAA/NWS Grand Forks	Service Hydrologist	amanda.lee@noaa.gov	
2/28/2023 11:11	Amy Anton	NDDES	Response Chief	ajanton@nd.gov	
2/28/2023 11:15	Andrew Nygren	Department of Water Resources	Hydrologist Manager	anygren@nd.gov	
2/28/2023 11:44	Angela Herda	Nelson County Emergency Management	Emergency Manager	aherda@nd.gov	
2/28/2023 11:15	Ben Leingang	ND Bureau of Criminal Investigation	Chief Agent	bleingang@nd.gov	
2/28/2023 10:53	Bradley Darr	NDDOT	State Maintenance Engineer	bdarr@nd.gov	

Timestamp	Name	Agency/Department	Position	Email Address	Phone number
2/28/2023 11:01	Brandon Beise	NDDOT	Maintenance Operations	bbeise@nd.gov	
2/28/2023 11:08	Brenda Vossler	NDDES	EMAP Co-Accreditation Manager	blvossler@nd.gov	
2/28/2023 11:08	Brenton Nesemeier	Department of Health and Human Services - Disease Control	Director of Field Services	bnesemeier@nd.gov	
2/28/2023 11:07	Bruce Hagen	ND Dept. of Commerce	Program Manager	bahagen@nd.gov	
2/28/2023 11:06	Carl Meyer	NDDES	Hazard Mitigation Specialist	carlmeyer@nd.gov	
2/28/2023 12:55	Carla Reinbold	University of Mary Campus Safety and Security	Coordinator	cmreinbold@umary.edu	
2/28/2023 11:12	Carrie Lasley	Atkins	Senior Planner	carrie.lasley@akinsglobal.com	
2/28/2023 11:07	Christi Fisher	USDA-NRCS	State Engineer	christi.fisher@usda.gov	
2/28/2023 11:11	Christopher Parisien	Turtle Mountain Band of Chippewa Indians	Law and Policy Research Specialist	chris.parisien@tmbci.org	
2/28/2023 11:31	Christopher Schenk	Eastern North Dakota and Northwest Minnesota Chapter American Red Cross	Disaster Program Manager	Christopher.schenk2@redcross.org	
2/28/2023 11:07	Cody VanderBusch	NDIC DMR OGD	Reclamation Supervisor	Cwvanderbusch@nd.gov	
2/28/2023 11:08	Corey King	NOAA, NWS Bismarck, ND	Emergency Response Specialist	corey.king@noaa.gov	
2/28/2023 11:14	Damon Grabow	NDDWR	Dam Safety Engineer	dmgrabow@nd.gov	

Timestamp	Name	Agency/Department	Position	Email Address	Phone number
2/28/2023 11:03	Daniel Schwartz	Logan County, North Dakota	Emergency Manager	loganem@nd.gov	
2/28/2023 11:06	Darin Hanson	NDDES	Homeland Security Division Director	dthanson@nd.gov	
2/28/2023 11:13	Darin Langerud	ND Dept of Water Resources	Division Director	dlangerud@nd.gov	
2/28/2023 11:08	David Nyhus	ND Department of Water Resources	Design Engineer/Construction Section Manager	dnyhus@nd.gov	
2/28/2023 10:53	Dawn Moen	OMB-Risk Management	Loss Control Analyst	dmmoen@nd.gov	
2/28/2023 11:14	Debbie LaCombe	NDDES	Preparedness Chief	dlacombe@nd.gov	
2/28/2023 10:59	Derek Kannenberg	NDDEQ	Hazardous Waste Manager	dkannenberg@nd.gov	
2/28/2023 10:57	Doug Nelson	ND State Fire Marshal Division	State Fire Marshal	ddnelson@nd.gov	
2/28/2023 12:13	Eric Jensen	NDDES	Strategic Communications Chief	ericjensen@nd.gov	
2/28/2023 11:01	Eric Upton	NDDES	Planning Section Chief	eupton@nd.gov	
2/28/2023 11:07	Eric Volk	ND Rural Water	Executive Director	ericvolk@ndrw.org	
2/28/2023 11:17	Fred Anderson	North Dakota Geological Survey	Geologist	fjanderson@nd.gov	
2/28/2023 11:07	Gary Haberstroh	NDDEQ	Environmental Engineer	ghaberst@nd.gov	
2/28/2023 11:34	Gary Stockert	Bismarck Emergency Management	Emergency Manager	gstockert@bismarcknd.gov	

Timestamp	Name	Agency/Department	Position	Email Address	Phone number
2/28/2023 11:01	George Gerhardt	ND Health and Human Services	Planning	ggerhardt@nd.gov	
2/28/2023 10:57	Gregory Gust	NDDES	Meteorologist	ggust@nd.gov	
2/28/2023 11:07	Jacob Just	ND Insurance Department	Director of Communications	jjust@nd.gov	
2/28/2023 12:13	James Schmidt	ND State Electrical Board	Executive Director	jamesschmidt@nd.gov	
2/28/2023 12:17	James Schmidt	ND State Electrical Board	Executive Director	jamesschmidt@nd.gov	
2/28/2023 11:16	Janell Quinlan	Heartland Consultants LLC	Planner	jquinlan@heartlandconsultants.org	
2/28/2023 11:40	Jeff Savadel	NOAA/NWS	Meteorologist in Charge	jeffrey.savadel@noaa.gov	
2/28/2023 11:08	Jeff Schild	National Weather Service-Bismarck	Lead Forecaster/Assistant WCM	jeffrey.schild@noaa.gov	
2/28/2023 12:25	Jeff Tescher	NDIRF	Director of Underwriting	jefftescher@gmail.com	
2/28/2023 11:07	Jenny Yearous	State Historical Society of North Dakota	Curator of Collections Management	jyearous@nd.gov	
2/28/2023 11:13	Jill Beck	North Dakota Realtors	CEO	Jill@ndrealtors.com	
2/28/2023 11:09	Jim Kaiser	National Weather Service Grand Forks	Warning Coordination Meteorologist	james.kaiser@noaa.gov	
2/28/2023 11:45	Jim Prochniak	Cass County, ND	Emergency Manager	prochniakj@casscountynd.gov	
2/28/2023 11:14	Joel Quanbeck	KLJ	Senior Planner	Joel.Quanbeck@kljeng.com	

Timestamp	Name	Agency/Department	Position	Email Address	Phone number
2/28/2023 11:09	Jorden Laducer	NDDHHS - CEU	CEU Training Coordinator	jladucer@nd.gov	
2/28/2023 11:10	Josh Loosmore	NDDES HazChem	HazChem Officer	JLoosmore@nd.gov	
2/28/2023 11:04	Justin Messner	NDDES	Recovery and Mitigation Chief	jmessner@nd.gov	
2/28/2023 11:08	Karen Goff	ND Department of Water Resources	Dam Safety Program Manager	kgoff@nd.gov	
2/28/2023 11:08	Kari Goelz	Grand Forks Emergency Management	Director	karise.goelz@gfcounty.org	
2/27/2023 6:06	Kathleen B. Donahue	NDDES	Deputy Planning Chief	kdonahue@nd.gov	
2/28/2023 5:23	Ken Jarolimek	Heartland Consultants	Planner	kjarolimek@heartlandconsultants.org	
2/28/2023 11:08	Ken Lake	US Bureau of Reclamation	Engineering Technician	klake@usbr.gov	
2/28/2023 10:57	Kent D Theurer	North Dakota Department of Agriculture	EM Coordinator	kdtheurer@nd.gov	
2/28/2023 11:12	Kevin J Dvorak	North Dakota Community Foundation	President/CEO	kdvorak@ndcf.net	
2/28/2023 11:06	Kimberly Robbins	LaMoure County Department of Emergency Services	Emergency Manager	krobbins@nd.gov	
2/28/2023 10:56	Kirk Hagel	NDDES/ NDSLIC	Deputy Director	kihagel@nd.gov	
2/28/2023 11:26	Kyle Erickson	North Dakota Center for Persons with Disabilities	Research Associate	kyle.erickson.1@MinotStateU.edu	
2/28/2023 10:56	Kylee Merkel	Bank of North Dakota	Business Banker	Kmerkel@nd.gov	

Timestamp	Name	Agency/Department	Position	Email Address	Phone number
2/28/2023 11:15	Larry Regorrah	NDDES	Exercise Officer	lregorrah@nd.gov	
2/28/2023 11:07	Laura Horner	North Dakota Department of Water Resources	Risk MAP Program Manager	lmhorner@nd.gov	
2/28/2023 11:08	Lindsay Wold	NDBCI/NDSLIC	SSA/Director	liwold@nd.gov	
2/28/2023 12:17	Lisa Lone Fight	MHA Nation (Fort Berthold Reservation)	Director MHA Science, Technology and Research Dept./Science Advisor to Chairman Mark Fox	Lisalonefight@gmail.com	
2/28/2023 11:07	Lori Beck	Towner County EM	Towner County EM	tchd@gondtc.com	
2/28/2023 10:59	Lorna Meidinger	SHSND	Lead Historic Preservationist	lbmeidinger@nd.gov	
2/28/2023 11:10	Margaret Walton	Atkins	Senior Planner III	margaret.walton@atkinsglobal.com	
2/28/2023 10:59	Maria Effertz	ND Commerce	Director - DCS	meffertz@nd.gov	
2/28/2023 11:20	Mary Senger	Burleigh County and Emmons County	Emergency Manager	msenger@nd.gov	
2/28/2023 11:51	Mary Soucie	NDSL	State Librarian	msoucie@nd.gov	
2/28/2023 11:08	McKenzie Richard	ND JOC	J3 Plans and Operations	mckenzie.g.richard.mil@army.mil	
2/28/2023 11:13	Megan Jones	NOAA, NWS Bismarck, ND	Forecaster	megan.e.jones@noaa.gov	

Timestamp	Name	Agency/Department	Position	Email Address	Phone number
2/28/2023 11:32	Melanie Bauer-Dukart	USDA Rural Development	Single Family Housing Program Director	melanie.bauerdukart@usda.gov	
2/28/2023 11:29	Michael Gill	Civil Air Patrol	Administration	michael.gill@ndcap.us	
2/28/2023 11:07	Michael Ziesch	Department of Mineral Resources	Staff Officer	mdziesch@nd.gov	
2/28/2023 10:54	Mike Kisse	NDDOT	Assistant Division Director - Maintenance	mkisse@nd.gov	
2/28/2023 10:55	Mike McHugh	ND Aeronautics Commission	Education Coordinator	mmchugh@nd.gov	
2/28/2023 11:07	Natasha Peterson	NDIT	Cyber Business Resilience Coordinator	nampeterson@nd.gov	
2/28/2023 11:00	Neil Johnson	NDDES	SW Regional Emergency Response Coordinator	neiljohnson@nd.gov	
2/28/2023 11:11	Noelyn Meckle	Department of Mineral Resources	Safety Officer	nemeckle@nd.gov	
2/28/2023 12:57	Pat Fridgen	North Dakota Department of Water Resources	Planning and Education Division Director	pfridgen@nd.gov	
2/28/2023 10:53	Patrick Isakson	North Dakota Game and Fish Dept	Conservation Biologist	pisakson@nd.gov	
2/28/2023 12:17	Paul Campbell	ND VOAD	Chair	paul.h.campbell@gmail.com	
2/28/2023 11:07	Phillip Peterschick	NDDES	GIS Section Chief	ppeterschick@nd.gov	

Timestamp	Name	Agency/Department	Position	Email Address	Phone number
2/28/2023 11:07	Randy Ehlis	U.S. Bureau of Reclamation	Program Management Specialist	rehlis@usbr.gov	
2/28/2023 11:18	Rob Pressly	FEMA Region 8	Community Planner	robert.pressly@fema.dhs.gov	
2/28/2023 11:07	Robert Lies	NDDES	Regional Emergency Response Coordinator	rlies@nd.gov	
2/28/2023 11:08	Roxanne Anderson	NDDES	PA Specialist	roxanneanderson@nd.gov	
2/28/2023 11:12	Ryan Maddock	WSI	Director of Strategic Operations	rpmaddock@nd.gov	
2/28/2023 11:11	Sandra Rohde	Dunn County Planning & Zoning/911 Coordinator	Administrator/Director	sandy.rohde@dunncountynd.org	
2/28/2023 11:07	Sarah Bailey	Dept of Ag / State Board of Animal Health	Assistant State Veterinarian	sbailey@nd.gov	
2/28/2023 11:11	Sean Johnson	ND Parks and Recreation Department	Planning and Projects Division Chief/Emergency Manager	Seajohnson@nd.gov	
2/28/2023 11:14	Shawn Kessel	Commerce	COO/Deputy Commissioner	skessel@nd.gov	
2/28/2023 11:10	Sindhuja S. Pillai-Grinolds	NDDWR	Water Development Division Director	spillai@nd.gov	
2/28/2023 11:08	Stacey Alexander	NDDHHS - Laboratory Services	Director of Biothreat	smalexander@nd.gov	
2/28/2023 10:53	Stewart Milakovic	NDDOT	Transportation Planner	smilakovic@nd.gov	
2/28/2023 11:15	Todd Hauge	BIA/Natural Resources	Safety of Dams Engineer	Todd.Hauge@bia.gov	

Timestamp	Name	Agency/Department	Position	Email Address	Phone number
2/28/2023 12:33	Todd Joersz	NDDES	State HM Officer	tjoersz@nd.gov	
2/28/2023 11:14	Traci Redlin	South Central Dakota Regional Council	Executive Director	tredlin@scdrc.org	
2/28/2023 11:00	Tyler Spomer	ND Department of Water Resources	NFIP Coordinator	tlspomer@nd.gov	
2/28/2023 11:13	Valquiria Quirino	NDSU - Center for Social Research	Research Specialist	valquiria.quirino@ndsu.edu	
2/28/2023 11:07	Zac Thompson	USDA Forest Service	Fire/Fuels	zachary.thompson@usda.gov	

C.5 SHMT Risk Assessment Meeting

C.5.1 Agenda

State of North Dakota Enhanced Mitigation Plan Risk Assessment Meeting
June 21, 2023, 9:00 a.m.
North Dakota Association of Rural Electric Cooperatives
3201 Nygren Drive NW, Mandan, ND 58554

Meeting Purpose: Discuss the current status of the enhanced mitigation plan update project; provide an overview of the hazard profiles and vulnerability analysis to the State Hazard Mitigation Team and obtain additional feedback; outline the current mitigation goals and actions; and prepare the hazard committees for mitigation action development.

Microsoft Teams meeting
Click here to join the meeting
Meeting ID: 299 179 616 724
Passcode: S8v4De

ITEM	DESCRIPTION	PRESENTERS
1.	Welcome and Overview	Darin Hanson, Homeland Security Director, ND Department of Emergency Services
2.	Project Overview and Current Status	Carrie Beth Lasley, PhD, Senior Planner II, Atkins Project Co-Lead Margaret Walton, CFM, Deputy Project Manager, Atkins
3.	Outreach Strategy and Public Involvement Activities	Hope Brighton, Mitigation Planning Specialist, Eric Jensen, Strategic Communications Chief, NDDES
4.	Risk Assessment Findings • Hazard History and Profiles • Climate Change and Adaptation • Conclusions on Risk	Carrie Beth Lasley and Margaret Walton Gregory Gust, Meteorologist, NDDES
5.	What is a Mitigation Strategy?	Atkins
6.	Developing Mitigation Actions	Atkins
7.	Project Schedule	Atkins
8.	Next Steps and Committee Meetings	Atkins
9.	Questions/Concerns	Kathleen Donahue, ND Project Co-Lead, NDDES-HLS

C.5.2 Meeting Notes

Meeting Narrative

Welcome and Introduction

The NDDES Risk Assessment Meeting was held on Wednesday June 21st at 9:00 AM at the ND Rural Electric Cooperative Office, 3201 Nygren Drive NW, Mandan, ND, 58554, and concluded at 12:00 PM. The meeting had in-person and virtual attendance options. NDDES Director Darin Hanson opened the meeting and explained the history of ND being the first State in FEMA Region VIII to achieve Enhanced Status and followed up with achieving Program Administered by State, or PAS, Status. Both demonstrate ND's dedication and demonstration to deliver high quality mitigation program management.

Project Overview and Current Status

Hazard Mitigation Plans are FEMA-approved documents that require updating every 5 years to remain in effect. North Dakota is one of three states to reach Program Administration by State status, a program established after Superstorm Sandy to create a more streamlined grant approval process allowing communities to receive hazard mitigation funds faster. North Dakota's commitment to long-term risk reduction is recognized in its enhanced mitigation status. This status recognizes the state's ongoing and coordinated work to reduce losses from natural hazards, protect property and life, and create more resilient communities. States with enhanced mitigation status receive an additional 5% in Hazard Mitigation Grant Program (HMGP) funds following a disaster.

NDDES has been conducting hazard committee meetings in preparation for this plan update. These meetings provide local expertise and input from relevant state officials that NDDES utilizes in the research phase of plan development.

Outreach Strategy and Public Involvement Activities

Engaging the public is a federal planning requirement and provides a valuable insight in understanding citizen's level of awareness and personal preparedness when it comes to hazards. During this plan update, NDDES launched two public surveys, one for the general public and one specifically for first responders and emergency management staff. The NDDDES planning team also engaged with partners in the university, library, and oil and gas sectors to gain diverse perspectives. The team hosted Community Coffees and public open house meetings that were family friendly, including preparedness related coloring activities for young children. The team strived to gain diverse input to gather whole community perspective while updating the SHMP.

Risk Assessment Findings

North Dakota addresses 14 individual hazards grouped into natural hazards, technological hazards, and adversarial threats.

Natural Hazards	Technological Hazards	Adversarial Hazards
Flood	Dam Failure	Cyber Attack
Severe Summer Weather	Space Weather	Civil Disturbance

Severe Winter Weather	Hazardous Materials Release	Criminal, Terrorist, or Nation-State Attack
Drought	Transportation Incident	
Geologic Hazards		
Wildfire/Urban Fire		
Infectious diseases		

The hazard mitigation team presented snapshots of each individual hazard to outline the hazard history with a focus on events occurring since the last plan update (2018). In addition to hazard history, each snapshot included a brief discussion of how climate change is expected to impact the frequency and intensity of the hazard, when applicable.

What is a Mitigation Strategy?

The Mitigation Strategy is an ongoing guide of potential future actions that can be taken to lessen the impact disasters have on people and property statewide. The Mitigation Strategy organizes actions by which agency could be the best leader for the activity, the priority, the timeline of implementation, identifies potential funding sources, and tracks progress made towards the mitigation goal over the lifespan of the plan. It defines the purpose and ties together the goals and objectives at a state level of implementation.

Developing Mitigation Actions

Developing mitigation actions first involves updating existing mitigation actions. These include actions that are identified in the previous version of the plan that may need to be updated to reflect changing conditions, new information, and/or new capabilities. As part of the plan update process, ND must provide updates to FEMA on the status of existing mitigation actions and progress made. Actions that are still incomplete may be left in place within the plan. Actions identified in the planning process that are not covered by the previous plan will become new mitigation actions. This should include any actions for which the state may like to seek mitigation funding for in the future.

Project Schedule

Quarter/Milestone	Estimated Invoice Date
Q1 January-March 2023 • Kick-off Meeting • Data Collection • THIRA Data Collection	March 2023
Q2 April-June 2023 • THIRA Development • Mitigation Strategy Development • Draft Plan Development	June 2023
Q3 July-September 2023 • Mitigation Strategy Development • Draft Plan Development	September 2023
Q4 October-December 2023 • Draft plan to state • Revisions from state implemented • Final draft submitted to FEMA	December 2023
Final Submission • FEMA approves final draft plan	January 2024*
* CONTRACTOR will submit a final invoice upon approval of the plan by FEMA, which may be after January 2024 if the Contract is extended.	

Next Steps and Committee Meetings

Next steps involve additional forms of public outreach and involvement. Meeting attendees and colleagues are encouraged to continue to submit data and relevant information to the hazard mitigation team as the plan development process continues. Hazard committees will reconvene toward the end of this summer to review hazard profiles, review past mitigation activities, and develop updated mitigation strategies.

Meeting Outline

- Welcome and Overview
    - Please see sign-in sheet for in-person attendance
    - Please see recording for virtual attendance
- Project Overview and Current Status
    - The Kick-off meeting, multiple hazard-specific committee meetings, and now Risk Assessment Meeting have occurred, and that builds into creating Mitigation Strategies
    - As locals, you know your state best; you can provide hazard specific information that create ND centric and valuable, useful, plan to guide and integrate with other plans moving forward
- Outreach Strategy and Public Involvement Activities
    - This is a federal requirement of the planning process
    - Partnership with universities, libraries, and oil and gas industry partners, for example
    - Digital public survey
    - Community Coffees
    - Partnering with the state's preparedness and other alerting system and capability
    - Striving to hear from the public, especially perspectives that may not always be captured and heard from (seeking a whole community perspective)
- Risk Assessment Findings
    - Hazard History and Profiles
        - Grouped by Natural, Technological, and Adversarial
        - PRI – Priority Risk Index (Probability, Impact, Spatial Extent, Warning Time, Duration) calculation that determines hazards and threats to be high, moderate, or low risk
        - HHPD – High Hazard Potential Dam is a new federal planning requirement category to be included with this plan update
    - Climate Change and Adaptation
        - How to adapt to and mitigate hazards in a changing environment?
        - Requires understanding climate past, present, and future
        - ND can expect larger, more frequent, and more severe precipitation events, or flood hazards (more severe flooding, rain events, increased stream flows, increased rate of run-offs)
        - 2021 was a record setting wildfire season and 2021 also recorded the highest number of structure fires in the years ranging from 2017-2021

        - A freezing fog incident that spanned ~two weeks triggered a request for a presidential declaration request that was ultimately denied. *Through the end of this century*, winter weather can also be expected to be larger, more frequent, and more intense incidents.
        - Hope: Severe winter weather should have a higher PRI score than identified in the last plan
        - Cyberattacks is actually regressing in PRI rank as better technology and education are becoming more readily available
        - Space Weather is in a new cycle, and it is already more active than was originally predicted
    - Conclusion on Risk
        - Hazards have shifted on PRI Scores –
            - High = flood, fire, drought, winter, and summer weather
            - Moderate = infectious disease/pest control, dam failure, cyber-attack, HAZMAT, space weather
            - Low = geological, criminal, terroristic or nation-state, civil disturbance, and transportation
                - Higher risk should result in higher priority and higher investment of funding
        - Group feedback about these changes:
            - Terrorist/Criminal may need to be bumped out as a separate hazard; however, if all of the group remains "low" then they could remain grouped
                - School Shooting is a specific incident type with an increasing trend which would validate separating "criminal" as a separate group
                - Also noted is the intent of a "criminal" and the intent of a "terrorist" is very different
            - Cyber-Attack may need to be promoted to High and remain a standalone hazard
- What is a Mitigation Strategy?
- Developing Mitigation Actions
- Project Schedule
- Next Steps and Committee Meetings
- Questions / Concerns

Enhanced Mitigation Mission Area Operations Plan (MAOP)

Risk Assessment Review and Mitigation Strategy Kickoff

June 21, 2023

2011 Red River Floods in Wiser/CBS News

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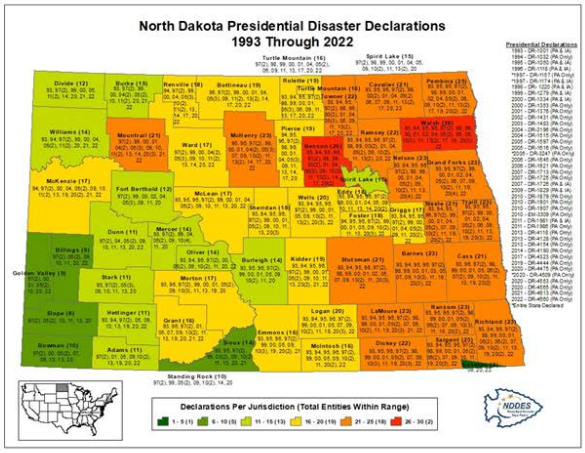
Welcome

Darin Hanson

North Dakota Homeland Security Director and Department of Emergency Services



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NDDES Homeland Security State Radio

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Mitigation Matters in North Dakota

https://www.youtube.com/watch?v=Rbs-PNFN6lk

NORTH Dakota
Be Legendary.

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Your Enhanced Mitigation Plan

- More than 80 partners make our mitigation plan possible.
- First in FEMA Region VIII to achieve enhanced status.
- One of 15 states in the United States to achieve this status.
- Increases eligibility for Hazard Mitigation Grant Program dollars.
- Assist other states with planning and grant management.

ENHANCED MITIGATION

Mission Area Operations Plan

Ensuring a safe and secure homeland for all North Dakotans

Program Administration by State

- Third State in the Nation to Achieve PAS
- We demonstrated 100 percent grants management compliance
- We demonstrated consistent application of federal planning regulations

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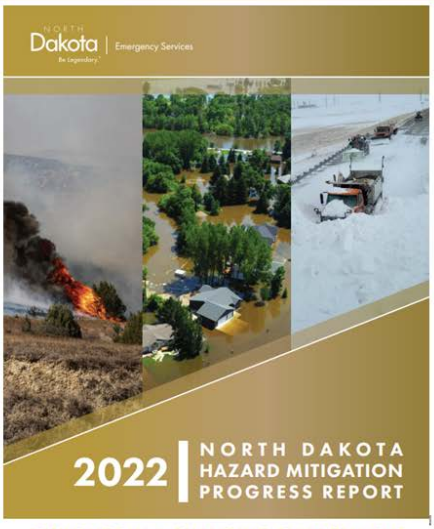
Mitigation at Work

- Direct Technical Assistance
- Plan Developers Meetings
- Community Coffees
- Annual Reports – Sharing Your accomplishments
- Reviewing Local Plans – Based on Your Area of Expertise



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Mitigation at Work

- 457 Mitigation Projects since 1997
- Savings of $6.54 per $1 invested
- $1.8 billion in savings

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Opportunities: STORM Act

- Our State Legislature amended Century Code to allow for implementation of the STORM ACT which:
  - Makes mitigation a reality for communities by providing one-percent low-interest loans for projects.
  - Affords communities 20 years for loan repayment.
  - Allows low-income communities 30 years for repayment.
  - Keeps payments in a revolving fund that ND can use the dollars to support other projects.

Together…

- Your continued participation will ensure we retain enhanced mitigation plan status.
- The insights you share today provide the foundation for a solid risk assessment.
- We can build a strategy that works for North Dakota.

Fargo-Moorhead Diversion: Toured by Hazard Mitigation Planning students, June 14, 2023

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Agenda

- Welcome
- Project Overview and Status
- Outreach Strategy and Public Involvement
- Risk Assessment Findings
- What is a Mitigation Strategy?
- Developing Mitigation Actions
- Project Schedule
- Next Steps

Highway 22 Landslide/North Dakota Department of Transportation

Housekeeping

- Make sure to sign-in
- Take and share our surveys

Public Survey for ND State Enhanced Mitigation Plan

Local & Tribal Staff Survey for ND State Enhanced Mitigation Plan

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Project Overview and Status

- Carrie Beth Lasley, co-Project Lead

Carrie.Lasley@atkinsglobal.com

- Margaret Walton, co-Project Lead

Margaret.Walton@atkinsglobal.com

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NORTH Dakota Be Legendary.

State Enhanced Plan Status

- Our Enhanced Mitigation Mission Area Operations Plan meets:
  - Standard State Hazard Mitigation Plan Requirements AND
  - More Stringent Enhanced Mitigation Plan Requirements
    - Entitles ND to 20% of the total estimated eligible Stafford Act disaster assistance versus 15% with standard plans
    - Requires a solid grant management track record
    - Demonstrates integration of planning efforts
    - Examines climate change and its impact

Tornado near Watford City, 2014/USA Today

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State Enhanced Plan Status

- Enhanced Status means more state control
  - Hazard Mitigation Grant Program Administration
  - Local Plan Review
  - Did we mention 5% more funding?

Casselton Train Derailment/NBC News

Planning Process

Establish Hazard Mitigation Planning Committee (HMPC)

Public participation and outreach to key stakeholders

Data collection and analysis

Plan preparation and submission

Meeting
Document Preparation
Execution

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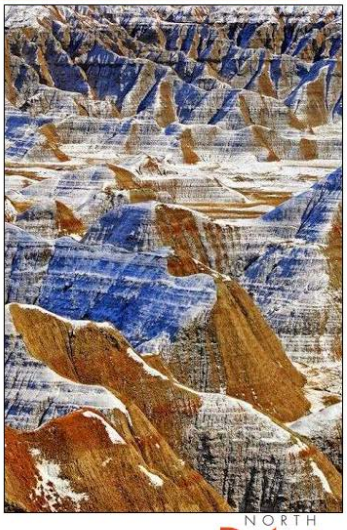
Current Committees

- Technical Advisory Committee – Overall guidance for plan, program development and implementation
- Hazard and Threat Committees – Provide expertise to analyze hazards and threats and identify mitigation actions to reduce risk
- Planning Committees – Address issues specific to mitigation planning concerns and program implementation, such as climate change



Public Involvement

- Public Site with Virtual Open House
- Public Meeting Tonight
- Social Media
- Local Staff and Public Surveys
- Ongoing Community Coffees

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Hazards and Threats

Natural Hazards

- Flood
- Summer Severe Weather
- Winter Severe Weather
- Drought
- Geologic Hazards
- Wildfire/Urban Fire
- Infectious Diseases and Pest Infestations

Technological Hazards

- Dam Failure
- Space Weather
- Hazardous Materials Release
- Transportation Incident

Adversarial Threats

- Cyber Attack
- Civil Disturbance
- Criminal, Terrorist or Nation-State Attack

Priority Risk Index (PRI)

PRI Category	Degree of Risk	
	Level	Criteria
Probability	Unlikely	Less than 1% annual probability
	Possible	Between 1 and 10% annual probability
	Likely	Between 10 and 100% annual probability
	Highly Likely	100% annual probability
Impact	Minor	Very few injuries, if any. Only minor property damage and minimal disruption on quality of life. Temporary shutdown of critical facilities.
	Limited	Minor injuries only. More than 10% of property in affected area damaged or destroyed. Complete shutdown of critical facilities for more than one day.
	Critical	Multiple deaths/injuries possible. More than 25% of property in affected area damaged or destroyed. Complete shutdown of critical facilities for more than one week.
	Catastrophic	High number of deaths/injuries possible. More than 50% of property in affected area damaged or destroyed. Complete shutdown of critical facilities for 30 days or more.

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Priority Risk Index (PRI)

PRI Category	Degree of Risk	
	Level	Criteria
Spatial Extent	Negligible	Less than 1% area impacted
	Small	Between 1 and 10% area impacted
	Moderate	Between 10 and 100% area impacted
	Large	100% area impacted
Warning Time	More than 24 hours	Self explanatory
	12 to 24 hours	Self explanatory
	6 to 12 hours	Self explanatory
	Less than 6 hours	Self explanatory
Duration	Less than 6 hours	Self explanatory
	Less than 24 hours	Self explanatory
	Less than one week	Self explanatory
	More than one week	Self explanatory

Identification of Hazards and Threats

Past Plan Rankings (2019)

High Risk	Moderate Risk	Low Risk
Cyber Attack	Wildfire/Urban Fire	Transportation Incident
Flood	Infectious Diseases and Pest Infestations	
Severe Winter Weather	Drought	
Severe Summer Weather	Hazardous Material Release	
	Space Weather	
	Dam Failure	
	Criminal, Terrorist or Nation-State Attack	
	Geologic Hazards	
	Civil Disturbance	

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North Dakota *Extreme* Climate Variability and *Potential* Climate Change

A broader and longer perspective on ND Hazards

Gregory Gust
Climate Change Committee Co-Chair
Meteorologist, NDDES
ggust@nd.gov
C: 701-219-4230

Some Terms and Attitudes you may encounter:

1. "The Climate is always changing."

   …and we can't really do anything about it

2. "Global Warming is out of control."

   …if we don't do xxYYYzz we're all going to die!

   …and its too late anyway

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It's Mainly Solar → +Changing Land Use ← It's Mainly GHGs

Some Terms and Attitudes you may encounter:

The Climate is changing… and will continue to change, due to natural causes like solar radiation fluctuations, geophysical fluctuations (volcanism, etc.)…

> ***…Climate Change Mitigation is the challenge we humans have to reduce our negative impacts on our environment and on our climate.***

Meanwhile… globally and locally our temperatures are rising, our climate is changing other ways as well, and these trends *are projected* to continue through the remainder of the century and beyond.

> ***…Climate Change Adaptation and Hazard Mitigation is reducing long-term risk to life and property from future climate-enhanced hazards.***

Review: Basic Climate Terminology

Climate Past - Historical Climate (*measurements*, records, data)

Period of Record (POR: 100+ years)
30-year Normals (means/extremes, 10 yr update)
Past day, month, year

Climate Present - Subseasonal to Seasonal (S2S) *Outlooks*
8-14 Day, 1-Month, 3-Month, 12-Month

Climate Future - Global and Regional Climate Model *Projections*

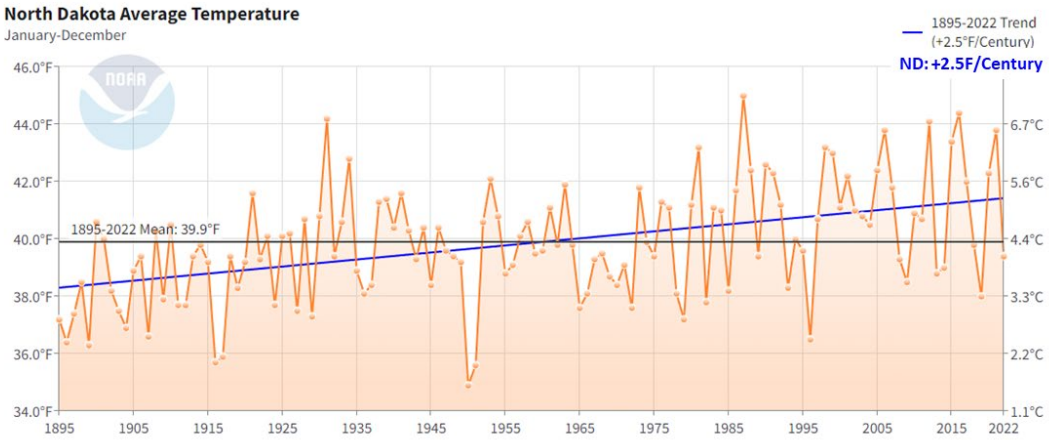
BCE	1850	17My	18My	25My	1Jn	Jul	JJA	05/2024	2025	2035-2100	22+
Geologic	Historic	Yesterday	Now	Wk 1	Wk 2	1-Mos	3-Mos	12-Mos	Years	Decades	Centuries

NDDES Homeland Security State Radio

Period of Record: ND Climate is Extreme!

ATKINS Member of the SNC-Lavalin Group

…and Highly Variable



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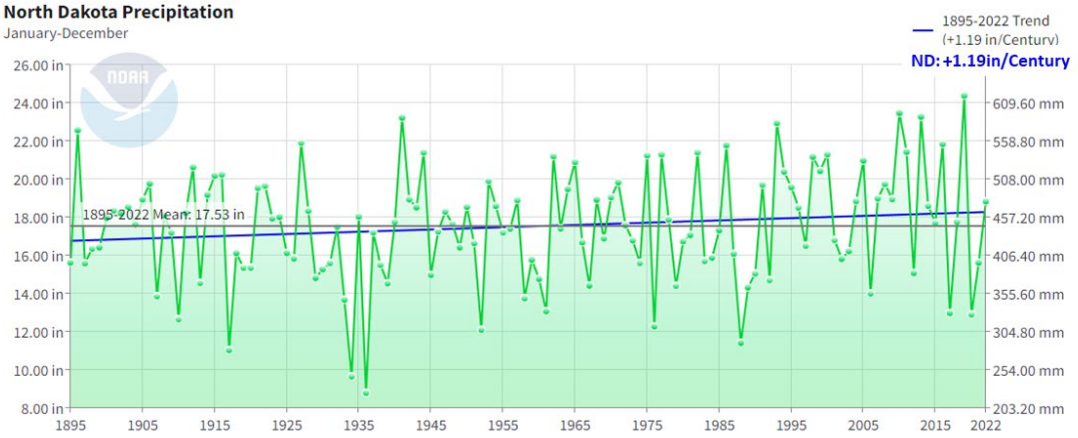
Period of Record: ND Climate is Extreme!

…and Highly Variable



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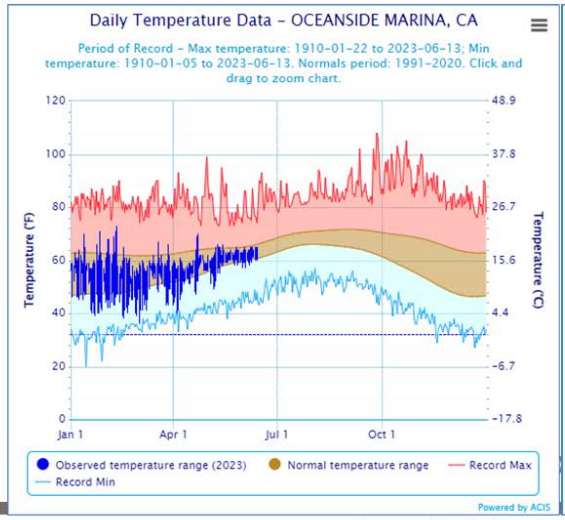
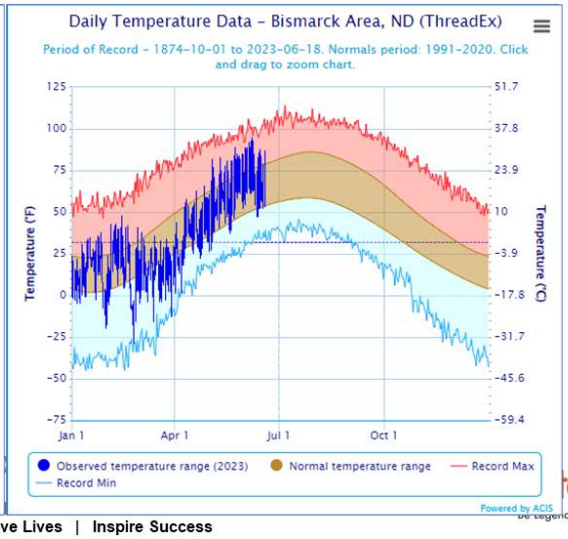
ND Extreme Climate Variability

…daily, weekly, monthly, annually





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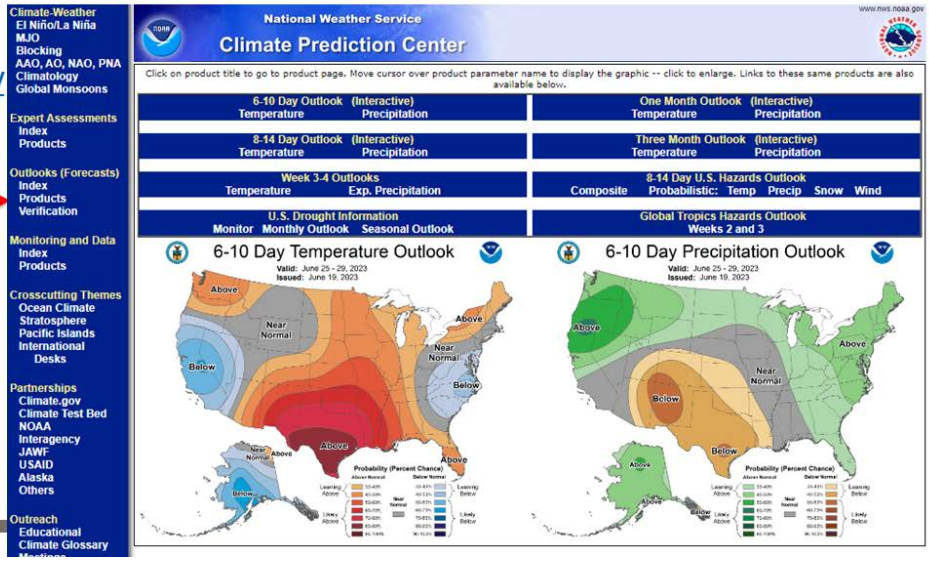
Climate Present - Subseasonal to Seasonal (S2S)

8-14 Day, 1-Month, 3-Month, 12-Month *Outlooks*

https://www.weather.gov/

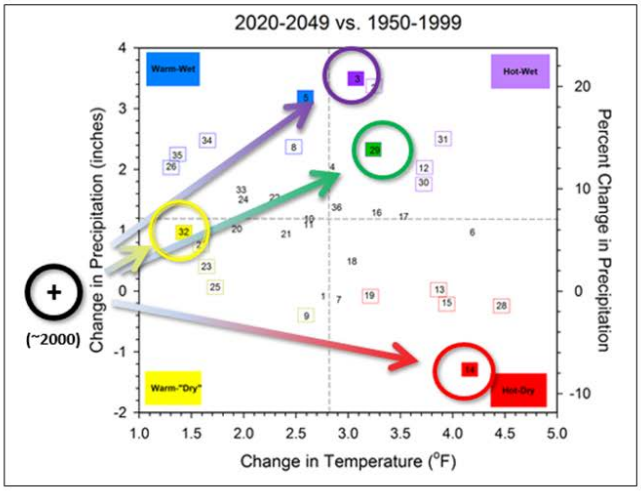
or

www.cpc.ncep.noaa.gov



Climate Future - Extreme Climate Variability

and Potential Climate Change: Multiple Possibilities



Climate Model Results (CMIP3)*:

- Annual Average Temperatures ***expected*** to continue warming.
  - Winter Min Temps warming fastest
  - Summer daytime highs slowest
  - Seasonal/annual variability persists
- Annual Average Precipitation ***likely*** to continue increasing.
  - Winter season increasing most
  - Spring/Fall seasons increase mid
  - Summer season increasing least
  - More intense rainfall

*** Similar outcomes from CMIP5 and CMIP6**

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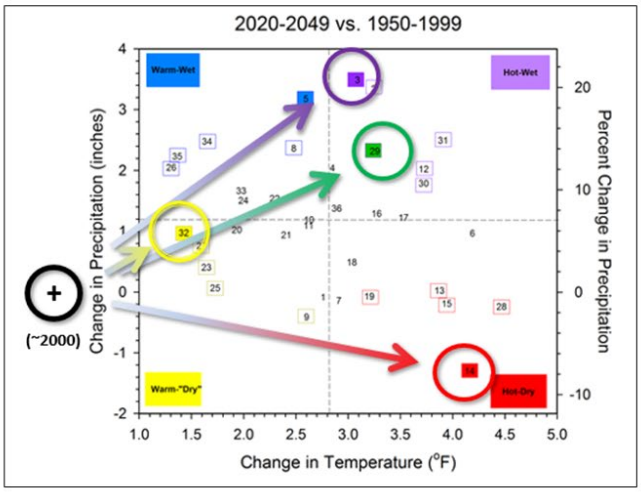
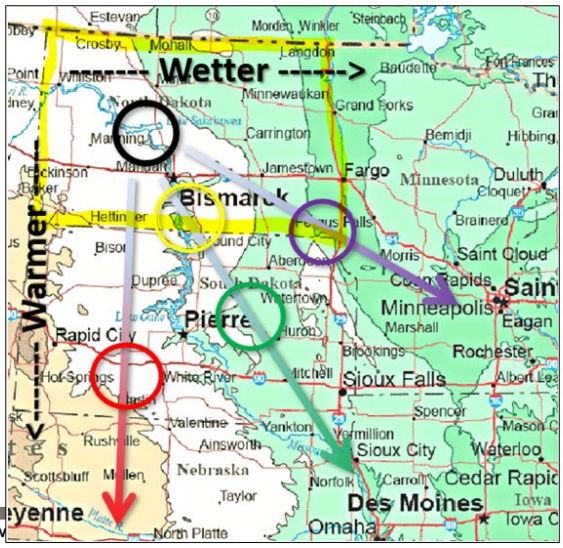
Climate Future - Extreme Climate Variability

and Potential Climate Change: Multiple Possibilities





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enhanced Multi-Hazard Mitigation

Regional Climate Model Results:

- Annual Average Temperatures ***expected*** to continue warming.
  - Winter Min Temps warming fastest
  - Summer daytime highs slowest
  - Seasonal/annual variability persists
- Annual Average Precipitation ***likely*** to continue increasing.
  - Winter season increasing most
  - Spring/Fall seasons increase mid
  - Summer season increasing least
  - More intense rainfall

14 Primary Hazards or Threats:

Civil Disturbance
Criminal, Terrorist, or Nation/State Attack
Cyberattack
Dam Failure
Drought
Fire (urban, structural collapse, and wildland fire)
Flood
Geologic Hazards (landslide, earthquake, etc.)
Hazardous Materials Release
Infectious Diseases and Pest Infestations
Severe Summer Weather
Severe Winter Weather
Space Weather
Transportation Incident

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enhanced Multi-Hazard Mitigation

Climate Model Results:

- Avg Temps ***expected*** to continue warming.
  - Winter lows fastest
  - Summer highs slowest
  - Variability persists
- Avg Precip ***likely*** to continue increasing.
  - Winter ice/snow up
  - Spring/Fall rain up
  - Summer rain up less
  - More intense storms

14 Primary Hazards/Threats:

Civil Disturbance
Criminal, Terror, Nation Attack
Cyberattack
Dam Failure
Drought
Fire (structural, wildland fire)
Flood
Geo-Hazards (landslide, etc.)
Hazardous Materials Release
Diseases & Pest Infestations
Severe Summer Weather
Severe Winter Weather
Space Weather
Transportation Incident

Crosscut with Sectors/Groups:

Forestry: native and non-native
Ag: Crops, Livestock, Grasslands,
Ecology: Waterfowl, Wetlands,
Water Supply/Water Quality:
  Dams: USACE, B-Rec, DWR
  Intergov: IJC, ISRB, RRBC, etc.
Energy:
  Coal, Oil/Gas, Wind, Solar
Transportation
Emergency Services/Public Safety
VOADs
Health and Human Services:
  Underserved and/or Vulnerable
Tribal/Local Specific Populations
Economy: Commerce, Finance
Other?

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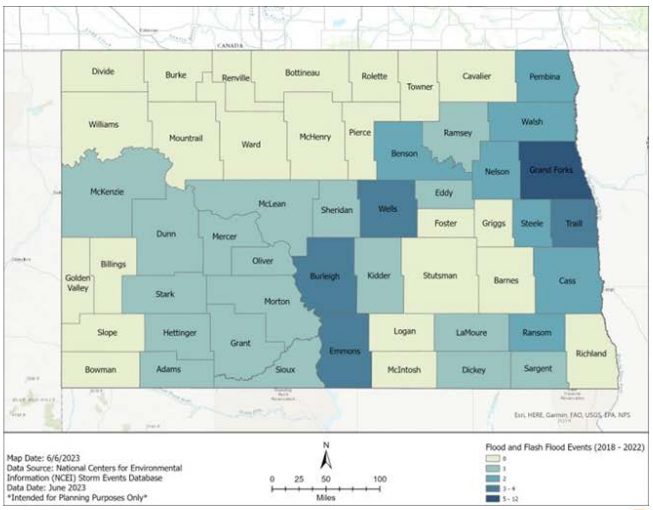
Flood

Probability: Highly Likely
Impact: Catastrophic

58 flood and flash flood events from 2018 - 2022

NCEI Data Summary (1996-2022)
Events: 1,152
Events per Year: 42.6
Deaths: 12
Injuries: 7
Total Damage: $4,083,806,000
Annualized Damages: $3,544,970.49



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Flood

Major River Gages by Time in Stage, overall vs. since the last plan

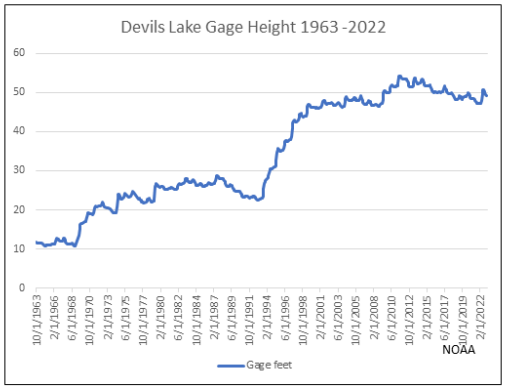
River Gage	Percent of Time in Stage					
	2007-2023			2018-2023		
	Minor	Moderate	Major	Minor	Moderate	Major
Red River at Grand Forks	4.8%	1.9%	0.5%	9.7%	4.5%	0.7%
Missouri River at Williston	13.4%	17.4%	35.3%	12.0%	20.8%	50.1%

NOAA

Billion-Dollar Floods that Include North Dakota since last plan

Flood	Dates	Deaths	CPI-Adjusted Cost (Millions)	Other Areas Impacted
Missouri River and North Central Flooding	March 14, 2019-March 31, 2019	3	$ 12,872.4	IA, MI, MN, MO, NE, SD, WI

FEMA



Flood and Future Climate

Flood Hazard: *Through the end of this century*, expect larger, more frequent, and more intense periods of heavy precipitation, both winter and summer. This may lead to more landscape flooding/flash flooding, higher annual streamflow, and a higher incidence of rainfall enhanced snowmelt flooding.

From the ND Multi-Hazard Annual Operating Plan (MAOP) Baseline Assessment, 2018-2022.

Condition	Projected Change through CY2100
Location	Flood hazard zones are located across the state and are projected to increase in size[1]. Flood prone areas in North Dakota include the Souris-Mouse River Basin, the James River Basin, and the Red River/Devils Lake Basin. This is not expected to change.
Extent / Intensity	Floods are projected to increase in intensity and *may* increase in extent[1].
Frequency	Heavy to extreme precipitation events are projected to occur more frequently, increasing the frequency of flood/flash flood events statewide. Flooding due to intense rainfall and concurrent spring snowmelt flooding is most common across the Souris-Mouse River, James River, and Red River/Devils Lake Basins, and is projected to increase.
Duration	It is uncertain whether floods will increase in duration, but they may[2].

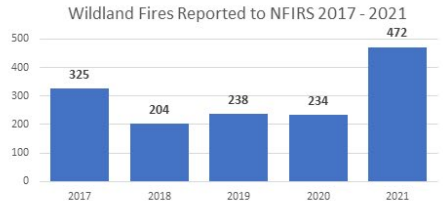
This table is based on summary information extracted from the NOAA National Centers for Environmental Information, summary for North Dakota, and the 4th National Climate Assessment, Chapter 22, for the Northern Great Plains.

Impacts: ??

Mitigation: ??

Wildfire/Urban Fire

Probability: Highly Likely
Impact: Catastrophic

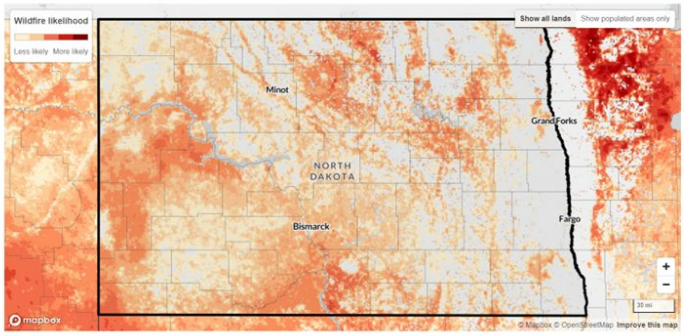


NFIRS, 2023

*Updated data coming soon from ND Forest Service, 2021 season actually had 37 fires over 300 acres, and 17 fires exceeding 1,000 acres. Typically, there are two to four 1,000+ acre fires.

Wildfire likelihood

Populated areas in North Dakota have, on average, greater wildfire likelihood than 57% of states in the US.



US Forest Service

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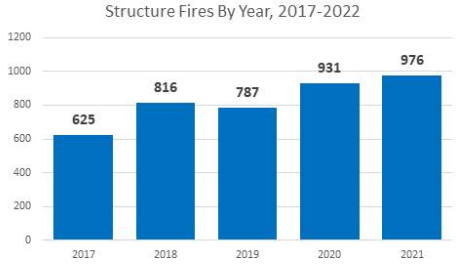
Wildfire/Urban Fire



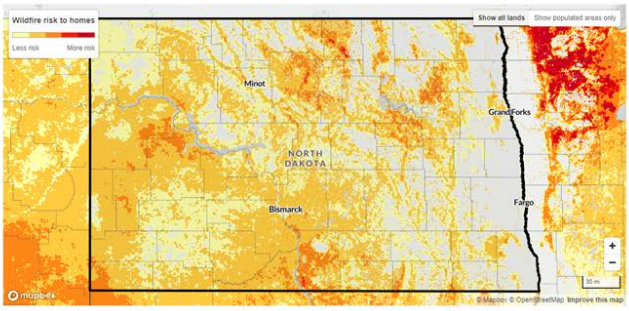
Calculating Structure Fire Losses, 2018-2022

Metric	Total	Annualized
ND Structure Fires	4,424	884.8
ND Structure Fire Deaths	27	5.4
ND Structure Fire Injuries	10	2.5
ND Structure Fire Dollar Loss	$ 130,866,840	$ 26,173,368

NFIRS, 2023; US Fire Administration, 2012

Risk to homes

Populated areas in North Dakota have, on average, greater risk than 59% of states in the US.



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Wildfire/Urban Fire and Future Climate

Wildfire Hazard: *Through the end of this century in North Dakota*, expect more frequent, larger, and more intense wildfires, with increasing frequency and/or longer duration of high wildfire (danger) potential periods.

From the ND Multi-Hazard Annual Operating Plan (MAOP) Baseline Assessment, 2018-2022.

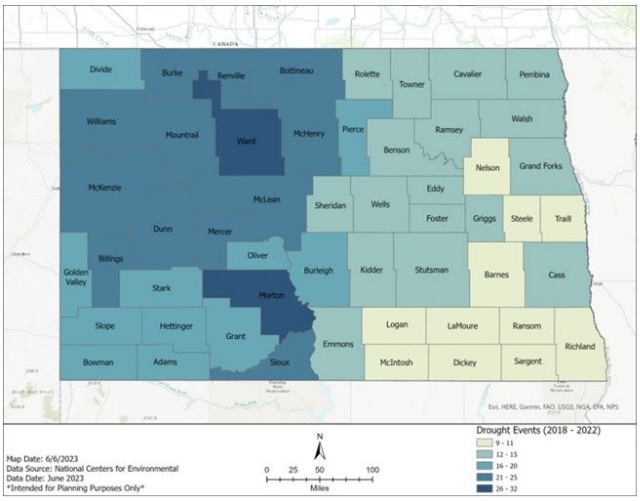
Condition	Projected Change through CY2100
Location	The areas at risk of wildland fires remained static through much of the past century but are projected to increase as populations shift and/or oil and gas development continues.
Extent / Intensity	Wildland fire extent/intensity is projected to increase commensurate with increased air temperatures, airmass instability, burn area size, and increased drying of vegetation.
Frequency	Increases in temperatures and the frequency/intensity of droughts have and will likely continue to increase the frequency of wildland fire.
Duration	Changes in seasonal temperatures and precipitation patterns can significantly affect wildland fire conditions. Fire season across North Dakota generally runs from March 1 through October 31, and generally coincides with the respective snow-free periods of each region in any particular year. Less snow and warmer temperatures outside of core winter months could increase season length. Higher evaporative stress (less rain and more summer heat could prolong fire conditions throughout the warm season

Impacts: ??

Mitigation: ??

Drought

Probability: Highly Likely
Impact: Critical



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Drought

Billion-Dollar Droughts that Include North Dakota since last plan

Drought	Dates	Deaths	CPI-Adjusted Cost (Millions)	Other Areas Impacted
Western/Central Drought and Heat Wave	June 2020-December 2020	45	$ 5,214.2	Western and Central States
Western Drought and Heat Wave	January 2021-December 2021	229	$ 9,696.1	Western and Central States

NCEI

North Dakota Drought by the Numbers, 2018-2022

No Drought		D0		D1		D2		D3		D4	
% of Time	Average % of State Impacted	% of Time	Average % of State Impacted	% of Time	Average % of State Impacted	% of Time	Average % of State Impacted	% of Time	Average % of State Impacted	% of Time	Average % of State Impacted
15.3%	42.5	84.8%	57.5	75.9%	39.1	59.1%	21.2	27.2%	8.4	8.4%	0.9

North Dakota Drought Change in Trends since last plan

No Drought		D0		D1		D2		D3		D4	
% of Time	Average % of State Impacted	% of Time	Average % of State Impacted	% of Time	Average % of State Impacted	% of Time	Average % of State Impacted	% of Time	Average % of State Impacted	% of Time	Average % of State Impacted
-10.2%	-0.2	-3.1%	0.2	18.5%	0.7	35.5%	1.1	57.0%	2.0	154.7%	2.9

Drought Impact Reporter, 2023

Drought and Future Climate

Drought Hazard: *Through the end of this century*, expect larger and more intense droughts, with increasing frequency and/or longer duration of drought periods in North Dakota.

From the ND Multi-Hazard Annual Operating Plan (MAOP) Baseline Assessment, 2018-2022.

Condition	Projected Change through CY2100
Location	Droughts are a threat throughout the state. Location is not projected to change.
Extent / Intensity	Droughts are projected to increase in extent and intensity.
Frequency	Droughts are projected to increase in frequency due to shifts in seasonal precipitation patterns, including drier summers and less precipitation falling as snow in spring or fall.
Duration	Droughts are projected to have a longer duration due to shifts in seasonal precipitation patterns, including drier summers and less precipitation falling as snow in spring or fall.

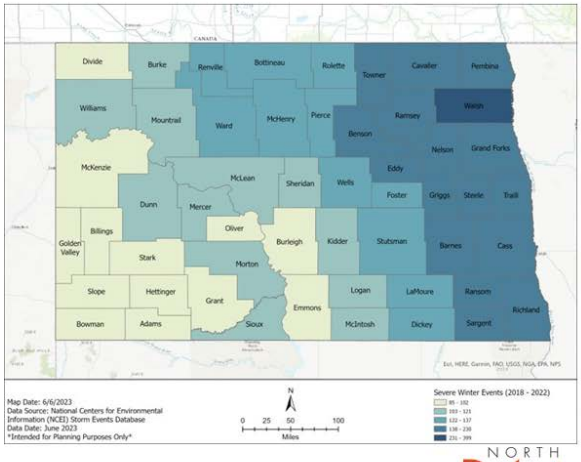
Impacts: ??

Mitigation: ??

Severe Winter Weather

Probability: Highly Likely
Impact: Limited

- (Select All)
- Blizzard
- Cold/Wind Chill
- Extreme Cold/Wind C
- Freezing Fog
- Frost/Freeze
- Heavy Snow
- Ice Storm
- Winter Storm



Impact of Winter Severe Weather 1996-2022

Type of Event	Event	Deaths	Injuries	Property Damage	Crop Damage
Blizzard	2,471	10	98	$ 271,700,000	$ -
Winter Storm	1,764	5	21	$ 39,957,000	$ -
Extreme Cold/Wind Chill	1,684	2	0	$ -	$ -
Heavy Snow	1,271	0	0	$ 9,055,000	$ 400,000
Cold/Wind Chill	500	8	2	$ 360,000	$ 75,000
Ice Storm	120	0	0	$ 100,300,000	$ -
Frost/Freeze	73	1	3	$ 15,000	$ -
Freezing Fog	6	1	0	$ 385,000	$ -
Grand Total	7,889	27	124	$ 421,772,000	$ 475,000

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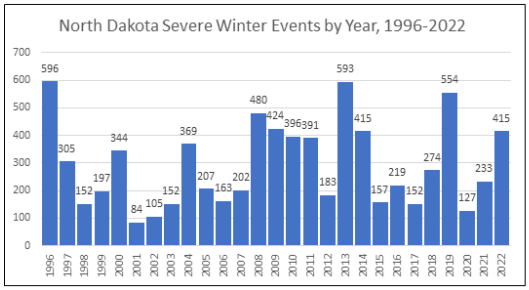
Severe Winter Weather



Annualized Consequences from Severe Winter Weather

Type of Event	Probability	Annualized Damages			
		Deaths	Injuries	Property Damage	Crop Damage
Blizzard	95.0 per year	0.4	3.8	$ 10,450,000	$ -
Winter Storm	67.8 per year	0.2	0.8	$ 1,536,808	$ -
Extreme Cold/Wind Chill	64.8 per year	0.08	0	$ -	$ -
Heavy Snow	48.9 per year	0	0	$ 348,269	$ 15,385
Cold/Wind Chill	19.2 per year	0.3	0.08	$ 13,846	$ 2,885
Ice Storm	4.6 per year	0	0	$ 3,857,692	$ -
Frost/Freeze	2.8 per year	0.04	0.1	$ 577	$ -
Freezing Fog	0.2 per year	0.04	0	$ 14,808	$ -

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Severe Winter Weather and Future Climate

Severe Winter Weather Hazard: ***Through the end of this century in North Dakota*****, expect larger, more frequent, and more intense periods of heavy snow and/or ice storms, with somewhat warmer temperatures.**

From the ND Multi-Hazard Annual Operating Plan (MAOP) Baseline Assessment, 2018-2022.

Impact	Projected Change through CY2100
Location	Severe winter weather is a threat throughout the state. Location is not projected to change.
Extent / Intensity	With projected increases in heavier snowfall and/or heavier snowfall rates and/or the incidence of freezing rain/ice storms, it is likely that severe winter weather events will increase in both extent and intensity.
Frequency	Blizzard and Heavy Snow events may occur less frequently, possibly balanced by an increase in Ice Storm events, during an overall shorter and somewhat milder winter season.
Duration	Severe winter weather events may increase in duration.

Impacts: ??

Mitigation: ??

Severe Summer Weather

Probability: Highly Likely

Impact: Limited

North Dakota Tornado Probability by Magnitude Since 1950

Magnitude	Frequency	Deaths	Injuries	Annualized Damages Property Damage	Crop Damage
EF0/F0	13.4 per year	0.0	53.6	$ 121,103.99	$ 117,107,558.00
EF1/F1	5.4 per year	0.0	140.4	$ 330,425.45	$ 128,865,924.00
EF2/F2	2.0 per year	0.0	136	$ 489,911.37	$ 71,527,060.00
EF3/F3	0.6 per year	0.0	22.8	$ 437,743.90	$ 17,947,500.00
EF4/F4	0.2 per year	0.1	20.6	$ 844,646.43	$ 11,825,050.00
EF5/F5	0.04 per year	0.0	0.5	$ 340,000.00	$ 102,000.00
All Tornados		**0.2**	**373.9**	**$ 2,563,831.14**	**$ 347,375,092.00**

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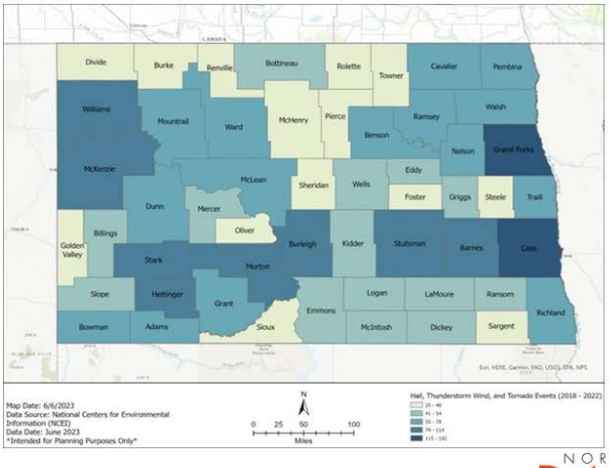

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Severe Summer Weather

Impact of Hail Events 1955-2022

Stone Size	Events	Injuries	Property Damage	Crop Damage
Less than 1 Inch	2,219	-	$ 1,274,000	$ 9,385,000
Between 1 and 2 inches	5,440	11	$ 175,694,600	$ 112,104,003
Between 2 and 3 inches	703	8	$ 258,758,000	$ 38,775,000
Between 3 and 4 inches	62	6	$ 107,777,000	$ 4,085,000
4 inches or Greater	49	7	$ 17,105,000	$ 6,950,000
Total	**8,473**	**32**	**560,608,600**	**171,299,003**

NCEI

North Dakota Wind Event Annualized Damages 1955-2022

Events	Deaths	Injuries	Property Damage	Crop Damage
125.4	0.09	1.5	$4,500,846	$3,120,866

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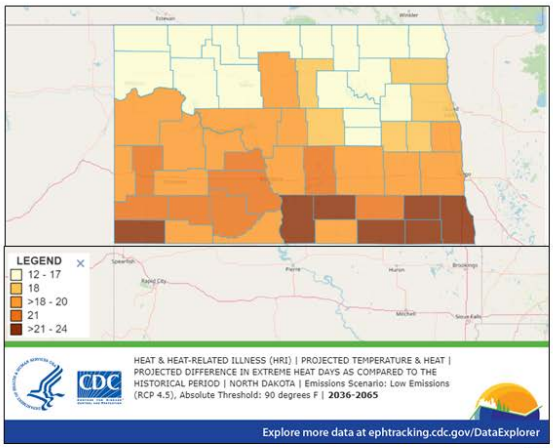


Severe Summer Weather and Climate Change

Severe Summer Weather Hazard: *Through the end of this century in North Dakota*, expect more frequent, larger, and longer duration storms with an increase in intense rain and flooding, and an increase in large hail.

From the ND Multi-Hazard Annual Operating Plan (MAOP) Baseline Assessment, 2018-2022.

Impact	Projected Change
Location	Severe summer weather is a threat throughout the state. Location is not projected to change.
Extent / Intensity	Severe summer weather events may increase in size/extent, as higher temperatures with higher moisture availability would produce a larger overall storm footprint. The Intensity of a storm depends on both stability and shear considerations within the developing storm which may or may not change significantly.
Frequency	Intense summer storms are projected to occur more frequently.
Duration	If severe summer weather events increase in size, then they will likely see a commensurate increase in duration over any one affected location.

Impacts: ?? **Mitigation: ??**

Infectious Diseases and Pest Infestation

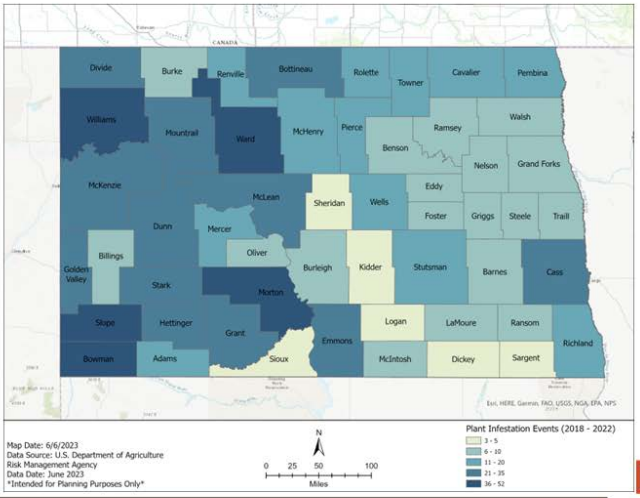
Probability: Highly Likely

Impact: Limited

Crop Insurance Indemnity Amounts for Pest and Plant Disease 2018-2022

Commodity	Amount	Annualized
Corn	$ 781,492.60	$ 156,298.52
Soybeans	$ 2,183,065.79	$ 436,613.16
Wheat	$ 14,350,926.92	$ 2,870,185.38
Canola	$ 3,425,755.80	$ 685,151.16
Dry Beans	$ 31,287.00	$ 6,257.40
Dry Peas	$ 1,805,804.85	$ 361,160.97
Sunflowers	$ 2,167,386.22	$ 433,477.24
Sugar Beets	$ 1,183,449.90	$ 236,689.98
Barley	$ 614,127.10	$ 122,825.42
Potatoes	$ 462,507.00	$ 92,501.40
Flax	$ 662,529.25	$ 132,505.85
Oats	$ 194,094.55	$ 38,818.91
Forage Production	$ 207,099.25	$ 41,419.85
Buckwheat	$ 22,973.25	$ 4,594.65
Mustard	$ 176,346.00	$ 35,269.20
Forage Seeding	$ 1,650.00	$ 330.00
Total	**$ 28,270,495.48**	**$ 5,654,099.10**

USDA Risk Management Agency



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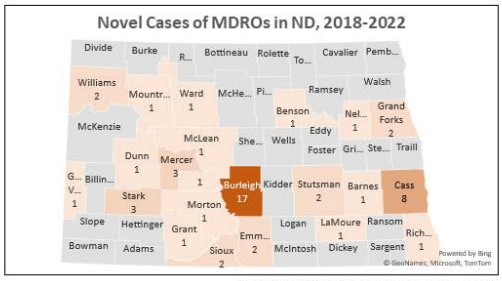
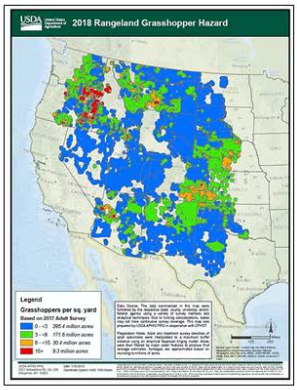
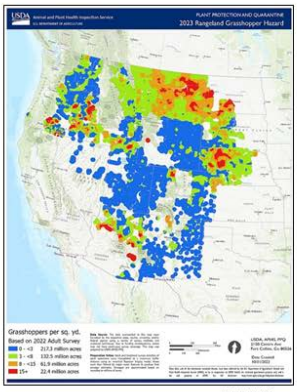
Infectious Diseases and Pest Infestation



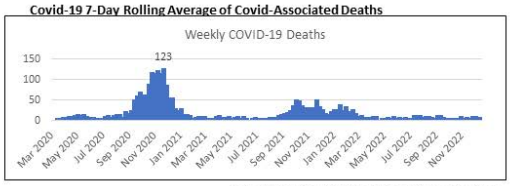
North Dakota Department of Health and Human Services





USDA APHIS

Covid-19 7-Day Rolling Average of Covid-Associated Deaths



North Dakota Department of Health and Human Services

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Diseases, Pest Infestation and Future Climate

Infectious Disease and Pest Infestation Hazard: *Through the end of this century in North Dakota*, expect larger, more frequent, and more intense outbreaks of certain infectious diseases and pests, though some human and animal diseases may decrease in occurrence.

From the ND Multi-Hazard Annual Operating Plan (MAOP) Baseline Assessment, 2018-2022.

Impact	Projected Change through CY2100
Location	Future climate conditions will influence vector-borne disease prevalence, but the direction of the effects (increased or decreased incidence) will be location and disease specific. Animal and plant diseases, noxious plants, and/or pests may spread to more northern regions, or spread more quickly, as average temperatures increase.
Extent / Intensity	Intensity and extent of certain human, animal, and plant diseases are projected to increase. Warmer and/or moister conditions may increase the prevalence of parasites and diseases that affect livestock and crops (i.e., the earlier onset of spring and warmer winters could allow some parasites and pathogens to survive more easily).
Frequency	Future climate conditions may affect the frequency of infectious disease (more/less).
Duration	Future climate conditions may affect the duration of human disease, some more and some less. With warmer winters, some existing agricultural pests can persist year-round.

Impacts: ??

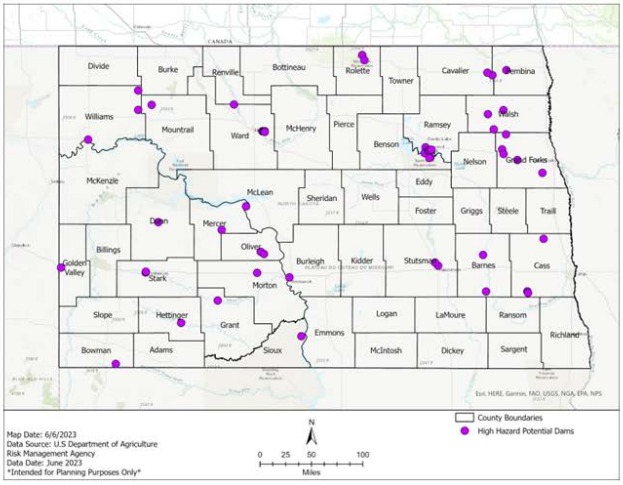
Mitigation: ??

Dam Failure

Probability: Likely

Impact: Minor

54 are High-Hazard Potential Dams, which are are those most likely to put a population at risk. There is a FEMA Hazard Mitigation Assistance Program focused on reducing this hazard.



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Dam Failure

Ownership of North Dakota Dams

Owner	Dams
Private	436
Local Government	306
Federal	156
State	42
Public Utility	8
Not Listed	2
Total	**950**

National Inventory of Dams

Age of Dams

Year Built	Dams
1800s	5
1900-1920	15
1921-1940	209
1941-1960	73
1961-1980	226
1981-2000	191
2001-present	90
Unknown	141

National Inventory of Dams

Dams by Classification and Condition in National Inventory of Dams, 2021

Potential Hazard	Dams	Condition		
		Poor	Fair/Satisfactory	Unavailable/Not Rated
High	54	10	18	26
Significant	65	0	0	65
Moderate	0	0	0	0
Low	786	23	49	731
Undetermined	45	0	0	45
Total	**950**	**33**	**67**	**867**

National Inventory of Dams
Bureau of Reclamation or others may have ratings on conditions not in National Inventory of Dams

DAMS
REPORT CARD FOR NORTH DAKOTA'S INFRASTRUCTURE 2019
ASCE

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Dam Failure and Future Climate

Dam Failure Hazard: *Through the end of this century*, expect larger, more frequent, and more intense periods of both drought and heavy precipitation. Higher rainfall/snowfall may lead to more flooding, higher annual streamflow, and a higher incidence of rainfall enhanced snowmelt flooding which may adversely impact both reservoir and dam infrastructure, especially if antecedent flood/drought-induced damage is present.

From the ND Multi-Hazard Annual Operating Plan (MAOP) Baseline Assessment, 2018-2022.

Condition	Projected Change through CY 2100
Location	Dam failures are possible at dam locations throughout the state. No particular location is known to be more susceptible to the effects of climate change at this time, though dams that are classified as "high hazard" should be of greatest concern.
Extent / Intensity	Due to projected increases in water levels and more frequent high intensity rainfall, the extent/intensity of impacts from dam failures may increase due to climate change.
Frequency	Climate change, along with other factors, may contribute to an increased frequency of dam failures in the future.
Duration	There is no known connection between climate change and the duration of dam failures.

Impacts: ?? **Mitigation: ??**

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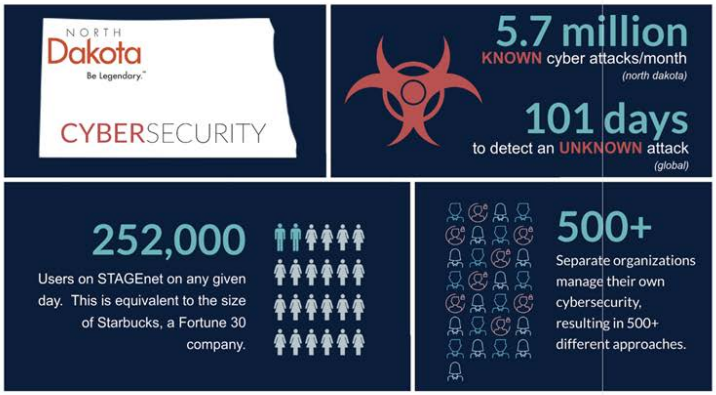
Cyberattack

Probability: Likely
Impact: Minor



North Dakota Department of Information Technology

Cyberattack and Climate Change

Cyber Attack Targets ND Workforce Safety & Insurance Data

AUGUST 26, 2022 - WORKCOMPWIRE

Bismarck, ND – North Dakota Workforce Safety & Insurance (WSI) recently announced that it was a victim of a cyber security attack on June 28, 2022, which involved personal data.

A WSI employee noticed unusual activity on their computer after opening an email attachment and reported the incident to the WSI Help Desk. At that time the computer was secured and removed from the state network. WSI immediately contacted North Dakota Information Technology (NDIT), who referred the incident to the NDIT Cyber Analysis and Response team. This team recently completed a forensic analysis of the computer.

The analysis determined that the sophisticated phishing attack was isolated to a single computer and did not spread onto the state network. There is evidence that the cyber attacker gained access to personal data in the employee's email through the email attachment that contained malicious code.

WSI reviewed the data in the emails and determined the emails did contain personal information of 182 injured employees.

NDIT makes online security assessment available for ND citizens

<< All News

Friday, December 11, 2020 - 09:00am

Categories: *Cybersecurity*

Bismarck, N.D. | Chief Information Security Officer Kevin Ford announced today the State of North Dakota Information Technology Department is providing a free online cybersecurity risk and vulnerability assessment to help citizens increase their ability to protect themselves and their personal devices from cyber-attacks.

The Personal Security Risk and Vulnerability Assessment online tool is available now at Defend.nd.gov. The assessment tool is designed to help individuals and families determine their home and personal security risks, both technological and physical, to enhance protection for all individuals. It provides a report with recommendations to decrease any risks that may be detected.

North Dakota company hit by cyber attack, more than 500,000 affected

April 25, 2022 by Jim Monk

WILLISTON, N.D. (KVRR) – Federal investigators say a cyber attack on a North Dakota-based company that provides software and billing services for doctors and healthcare professionals affected more than a half-million customers.

The U.S. Dept. of Health and Human Services says Adaptive Health Integrations of Williston was the target of a "Hacking/IT incident." The data breach was reported to the government earlier this month. It happened on, or about Oct. 17, 2021.

Cyberattack and Future Climate

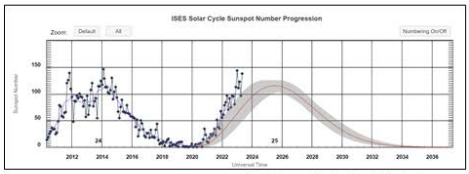
From the ND Multi-Hazard Annual Operating Plan (MAOP) Baseline Assessment, 2018-2022.

Condition	Projected Change
Location	There is no known connection between climate change and the location of Cyberattacks.
Extent / Intensity	There is no known connection between climate change and the extent / intensity of Cyberattacks.
Frequency	There is no known connection between climate change and the frequency of Cyberattacks.
Duration	There is no known connection between climate change and the duration of Cyberattacks.

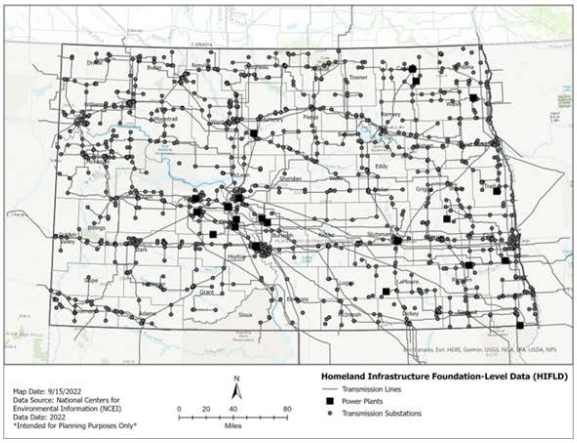
Space Weather

Probability: Possible
Impact: Limited

Solar Cycle 25 Progression



NOAA Space Weather Prediction Center



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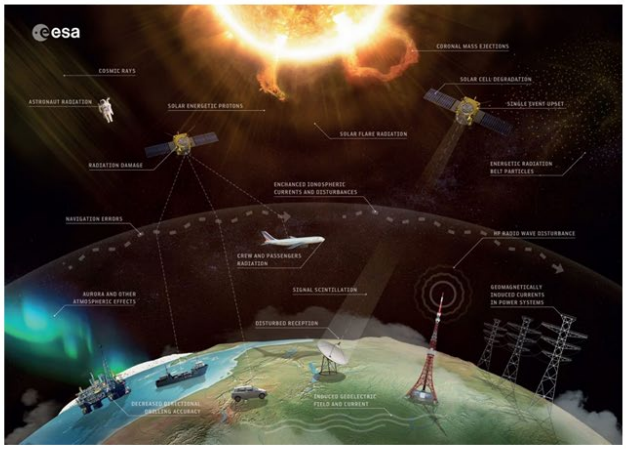
Space Weather

- Aviation and other GPS-dependent sectors experience significant disruption
- Issues remain on how to reach public without traditional means of communication



European Space Agency

Space Weather and Future Climate

Space weather Hazard: *Through the end of this century in North Dakota*, future climate conditions are not expected to directly impact the occurrence of space weather events, though indirectly the Extent, Intensity, and Frequency of hazard related impacts *could potentially be increased*.

From the ND Multi-Hazard Annual Operating Plan (MAOP) Baseline Assessment, 2018-2022.

Condition	Projected Change
Location	Space weather is a threat throughout the state. Location is not projected to change.
Extent / Intensity	Climate change **may** not directly impact the extent or intensity of space weather events, ***but it could affect the level of impacts through secondary/tertiary means***.
Frequency	Climate change **may** not directly impact the frequency of space weather events, ***but it could affect the level of impacts through secondary/tertiary means***.
Duration	Climate change is not expected to impact the duration of space weather events.

Impacts: ??

Mitigation: ??

Hazardous Materials Release

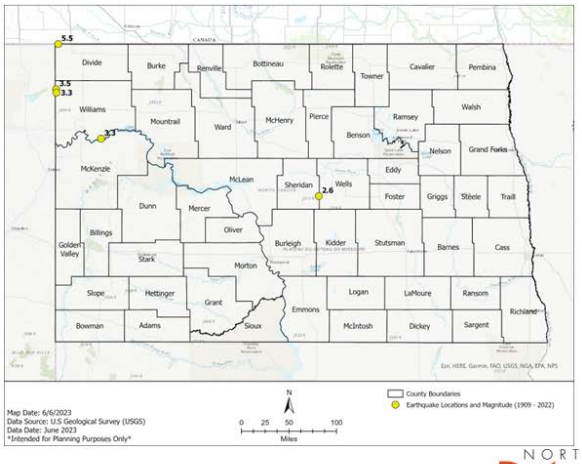
Probability: Likely
Impact: Limited

Impacts of NRC Incidents, 2018-2022

Year	Incidents	Fatalities	Injuries	Hospitalized	Evacuated	Damages
2022	80	7	5	3	120	$300,000
2021	45	4	1	0	0	$150,000
2020	50	2	3	3	120	$200,000
2019	75	4	5	5	30	$350,000
2018	80	7	5	3	120	$300,000
Annualized	**66**	**4.8**	**3.8**	**2.8**	**78**	**$260,000**

National Response Center/U.S. Coast Guard

*Updated data coming from state sources



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Hazardous Materials Release

NRC Incidents Resulting in Road Closures

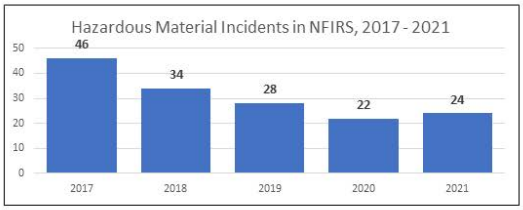
Year	Incidents
2022	2
2021	5
2020	2
2019	3
2018	2

National Response Center/U.S. Coast Guard

NRC Incidents Resulting in Rail Track Closures

Year	Incidents
2022	16
2021	9
2020	12
2019	15
2018	2

National Response Center/U.S. Coast Guard



NFIRS

NFIRS

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HazMat Release and Future Climate

From the ND Multi-Hazard Annual Operating Plan (MAOP) Baseline Assessment, 2018-2022.

Condition	Projected Change
Location	Hazardous material releases are possible throughout the state. This is not expected to change.
Extent / Intensity	Hazardous material releases may increase as both a direct[1] and an indirect[2] result of climate change.
Frequency	The frequency of hazardous material releases may increase as both a direct[1] and an indirect[2] result of climate change.
Duration	The duration of hazardous material releases may or may not change.

This table is based on information extracted from the NOAA National Centers for Environmental Information, summary for North Dakota; the 4th National Climate Assessment, Chapter 22, for the Northern Great Plains; and related resources.

3. **Warmer temperatures may directly result in expansion of gases, increases in biologic agents, or other such actions that could put hazardous material storage containers and or facilities at an increased risk.**

4. **Increased summer and winter storms, wildfires, floods, transportation incidents, etc. could indirectly put hazardous material containers and/or facilities at an increased risk.**

Impacts: ??

Mitigation: ??

Geologic Hazards

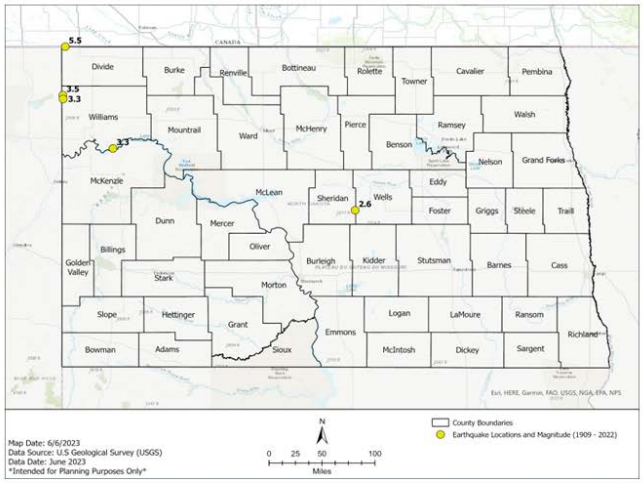
Probability: Possible

Impact: Limited

Crop Insurance Indemnity Amounts for Earthquakes, 2018-2022

Commodity	Amount	Annualized
Corn	$ 25,199.50	$ 5,039.90
Soybeans	$ 22,756.00	$ 4,551.20
Wheat	$ 62,911.00	$ 12,582.20
Dry Beans	$ 23,130.00	$ 4,626.00
Dry Peas	$ 6,170.00	$ 1,234.00
Barley	$ 978.00	$ 195.60
Total	**$ 141,144.50**	**$ 28,228.90**

USDA Risk Management Agency



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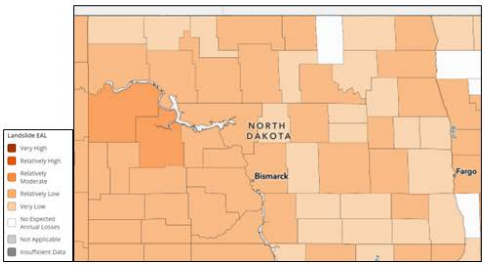
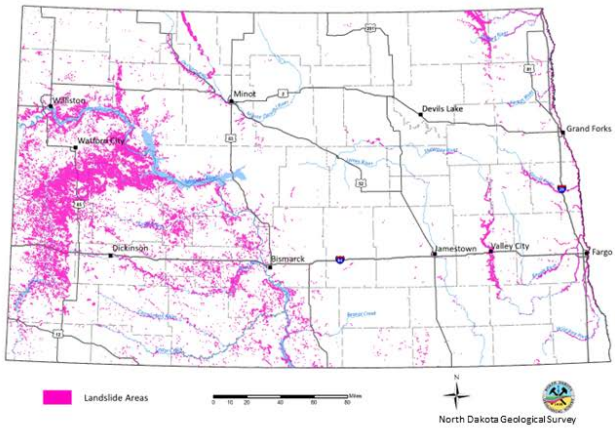
Geologic Hazards



FEMA/National Risk Index



Geologic Hazards and Future Climate

Geologic Hazard: ***Through the end of this century in North Dakota*****, expect more frequent, larger, and more intense geologic hazards, such as erosion, landslides, riverbank collapse, and sink holes.**

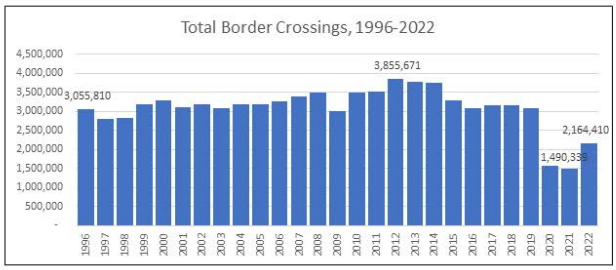
From the ND Multi-Hazard Annual Operating Plan (MAOP) Baseline Assessment, 2018-2022.

Condition	Projected Change
Location	The location of geologic hazards is not projected to change.
Extent / Intensity	The extent and intensity of geologic hazards may change due to climate change, as impacts from projected Future Climate heat and/or precipitation increase.
Frequency	Both Drought and Heavy Precipitation events are projected to occur more frequently, which may contribute to an increased frequency of landslides where steep slopes are present or to riverbank collapse where undercutting due to subsoil flow and/or antecedent flooding is possible. Potential for increase wind and water erosion.
Duration	The duration of geologic hazards is not projected to change.

Impacts: ?? **Mitigation: ??**

Criminal, Terrorist or Nation-State Attack

Probability: Unlikely
Impact: Critical



Bureau of Transportation Statistics

Terrorist Screening Center Encounters, 2018-2022

County	Encounters
Cass	3
Ramsey	1
Ward	1
Stark	1
Burleigh	1
Pembina	1
Williams	1
Unknown	1

North Dakota State and Local Intelligence Center

Adversarial Threats and Future Climate

From the ND Multi-Hazard Annual Operating Plan (MAOP) Baseline Assessment, 2018-2022.

Condition	Projected Change
Location	There is no known connection between climate change and the location of specific Adversarial Threats.
Extent / Intensity	There is no known direct[1] connection between climate change and the extent / intensity of specific Adversarial Threats, though indirect[2] connections are possible.
Frequency	Climate change may act as an indirect[2] threat multiplier by increasing existing social tensions which may lead to more frequent Adversarial Threat activities.
Duration	There is no known connection between climate change and the duration of specific Adversarial Threats.

This table is based on information extracted from the NOAA National Centers for Environmental Information, summary for North Dakota; the 4th National Climate Assessment, Chapter 22, for the Northern Great Plains; and related resources.

1. **ND's extreme Climate Variability is a more predominant *local* factor, while potential Climate Change is a more subtle factor. Future climate would not necessarily promote nor prevent a specific threat, while specific weather episodes may delay or advance such actions.**
2. **Increased heat stress, along with increased summer and winter storms, wildfires, floods, transportation incidents, etc. could increase social unrest, which could encourage increased Adversarial Threat.**

Impacts: ??

Mitigation: ??

Civil Disturbance

Probability: Unlikely
Impact: Limited


The tear gas has settled, but fear pervades in Fargo after weekend riot

Before the violence began in downtown Fargo on May 30, Alissa Vinson Ramsey comforts a protester at the police line on First Avenue North. C.S. Hagen / The Forum

By C.S. Hagen
June 05, 2020 at 5:00 AM

Civil Disturbance and Future Climate

From the ND Multi-Hazard Annual Operating Plan (MAOP) Baseline Assessment, 2018-2022.

Condition	Projected Change
Location	Civil disturbance because of climate change can occur anywhere but is more likely at events/locations that can be tied to climate change, such as at a political rally or at the site of an oil field.
Extent / Intensity	Some research has linked the effects of climate change to an increasing intensity of civil disturbance, specifically in developing countries, but climate change is not expected to impact the extent or intensity of civil disturbance in North Dakota.
Frequency	Growing concern over climate change may result in more frequent protests that can lead to civil disturbance.
Duration	There are no known connections between climate change and the duration of civil disturbance.

Impacts: ??

Mitigation: ??

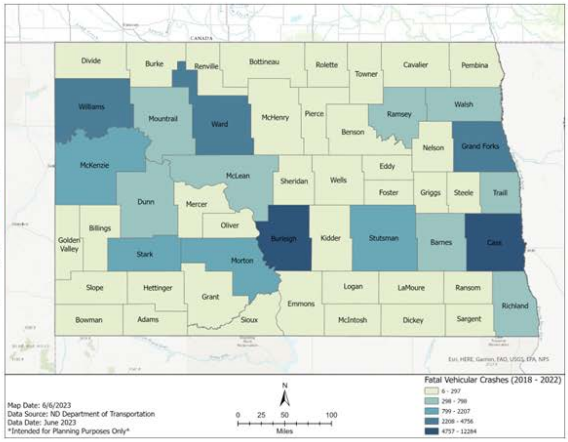
Transportation Incident

Probability: Unlikely
Impact: Minor

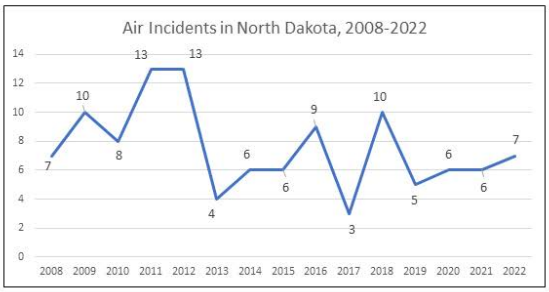
Costs of North Dakota Accidents, 2017-2021

Category	Number	Cost Per	Total Loss Estimation	Difference from 2012-2016	Annualized Loss Estimation 2017-21
Deaths	522	$ 1,778,000	$928,116,000	-$311,150,000	$185,623,200
Injuries	20,293	$ 40,000	$811,720,000	-$207,680,000	$162,344,000
Vehicles (min.)	63,148	$ 5,700	$359,943,600	-$116,354,100	$71,988,720

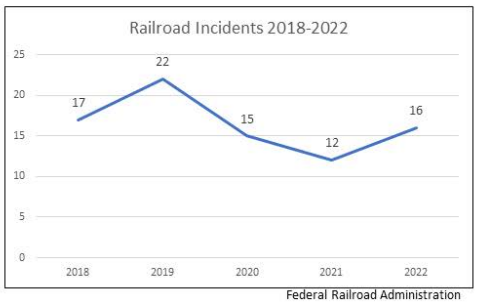
North Dakota Department of Transportation



Transportation Incident



NTSB/CAROL



Federal Railroad Administration

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Transportation Incidents and Future Climate

From the ND Multi-Hazard Annual Operating Plan (MAOP) Baseline Assessment, 2018-2022.

Condition	Projected Change
Location	Transportation incidents are possible statewide. Climate change will not affect this.
Extent / Intensity	Climate change is not expected to impact the extent or intensity of transportation incidents.
Frequency	Climate change may impact the severity and frequency of severe winter and summer weather events, which in turn may impact the frequency of transportation incidents.
Duration	Climate change is not expected to impact the duration of transportation incidents.

Rail expansion and contraction… maybe faster and/or larger swings in temperatures. Potential for rail/railbed issues.
Heat as function of severe weather and/or Drought
Roadbeds and erosion… rapid swings from flash drought/drought to flood, and increased risk for erosion on slopes.

Impacts: ?? Mitigation: ??

What changed (provisionally)?

- Wildfire/Fire and Drought moved from Moderate to High due to increasing likelihood due to changing conditions
- Cyberattack went from High to Moderate due to more resources, experience and knowledge around the issue
- Geologic Hazards went from Moderate to Low due to increased resources to plan for landslides, the most common threat
- Space Weather moved from Low to Moderate due to increased probability in the current solar cycle
- Civil Disturbance and Criminal, Terrorist or Nation-State Attacks went from Moderate to Low due to increased public awareness about reacting to these events

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PRI Findings

Hazard	Category/Degree of Risk					
	Probability	Impact	Spatial Extent	Warning Time	Duration	PRI Score
Natural Hazards						
Flood	Highly Likely	Catastrophic	Large	More than 24 hours	More than 1 week	3.7
Severe Summer Weather	Highly Likely	Limited	Large	Less than 6 hours	Less than 6 hours	3.1
Severe Winter Weather	Highly Likely	Limited	Large	6 to 12 hours	Less than 1 week	3.2
Drought	Highly Likely	Critical	Large	More than 24 hours	More than 1 week	3.4
Geologic Hazards	Possible	Limited	Negligible	Less than 6 hours	Less than 6 hours	1.9
Wildfire/Urban Fire	Highly Likely	Catastrophic	Small	Less than 6 hours	Less than 1 week	3.5
Infectious Disease and Pest Infestations	Highly Likely	Limited	Moderate	More than 24 hours	More than 1 week	2.9
Technological Hazards						
Dam Failure	Likely	Minor	Moderate	Less than 6 hours	Less than 6 hours	2.3
Space Weather	Possible	Limited	Large	Less than 24 hours	Less than 24 hours	2.2
Hazardous Material Release	Likely	Limited	Negligible	Less than 6 hours	Less than 6 hours	2.2
Transportation Incident	Unlikely	Minor	Negligible	Less than 6 hours	Less than 6 hours	1.3
Adversarial Threats						
Cyber Attack	Likely	Minor	Moderate	Less than 6 hours	Less than 6 hours	2.3
Civil Disturbance	Unlikely	Limited	Negligible	More than 24 hours	Less than 24 hours	1.4
Criminal, Terrorist or Nation-State Attack	Unlikely	Critical	Negligible	Less than 6 hours	Less than 6 hours	1.9

Identification of Hazards and Threats

High Risk	Moderate Risk	Low Risk
Flood *(up 1 spot)*	Infectious Diseases and Pest Infestations *(Up 1 spot)*	Geologic Hazards *(Up 2 spots)*
Wildfire/Urban Fire *(Up 4)*	Dam Failure *(Up 4)*	Criminal, Terrorist or Nation-State Attack *(Down 1)*
Drought *(Up 4)*	Cyber Attack *(Down 7)*	Civil Disturbance *(no change)*
Severe Winter Weather *(Down 1)*	Hazardous Material Release *(no change)*	Transportation Incident *(no change)*
Severe Summer Weather *(Down 1)*	Space Weather *(no change)*	

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What is a Mitigation Strategy?

- Provide a framework for the State
- Includes:
  - Purpose
  - Goals
  - Objectives

NORTH Dakota Be Legendary.

Mitigation Goals

Goal 1: Develop and implement state, local, and tribal mitigation plans that reflect a sound understanding of hazards and threats.

Goal 2: Promote hazard and threat awareness and preparedness within the whole community, inclusive of individuals with access and functional needs and limited English proficiency.

NORTH Dakota Be Legendary.

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Mitigation Goals

Goal 3: Promote resiliency of current and future buildings and infrastructure systems from the impacts of hazards and threats.

Goal 4: Preserve/protect people, property, and natural and cultural resources from the impacts of hazards and threats. Ensure that communities are resilient to the impacts of hazards and threats.

Mitigation Strategy: Two Step Process

1. Update Existing Mitigation Actions

- Actions that are already in your current plan.
- Must provide an update to FEMA on progress that has been made to implement actions.
- You may keep these in place if they are incomplete.

*It is ok if no progress has been made, but we need to state that in the plan!

2. Develop New Mitigation Actions

- Actions that are not in your current plan.
- Your plan should include any actions you might want to use mitigation dollars for in the future or FEMA won't fund.

*If you want a building code program, generators, storm shelters or to elevate homes, etc. you need an action in the plan.

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Action ID #	Action Title	Action (Statement)	2018 Action Description	Goal and Objective ID	Potential Funding	Implementation Timeline	2018 Status	Priority	Agency
			the State's building code program; and samples of best practices.						
2019-3	Building Codes and Zoning Ordinances	Encourage local jurisdictions to develop and update building codes and zoning ordinances.	Building codes and zoning ordinances promote mitigation principles by outlining requirements and restrictions to keep communities safer. Examples include: • Floodplain ordinances • Defensible space (fire prevention) • Snow load building requirements	3.2	Existing State and Federal Budgets/ Programs	Ongoing	Ongoing - Already initiated and continuing	Low	NDDoC (Lead); NDDES
2019-4	Cultural and Historical Preservation	Promote the participation of cultural and historical preservation organizations in the planning process.	This Whole Community action calls for leveraging the expertise of cultural and historical preservation organizations when analyzing risk and vulnerability and identifying mitigation measures designed to protect cultural and historical resources.	1.4	Existing State and Federal Budgets/ Programs	Ongoing	Ongoing - Already initiated and continuing	Medium	NDDES (Lead); SHSND; NDSU Extension Service

Examples of Potential New Actions

Activities for Consideration

Activity	New or Update	Pros	Cons	Appropriate for the community and its flood problems? (Yes or No)	Explanation of why or why not appropriate
Preventive Activities					
Comprehensive or Land Use Plan	Update	Land use planning helps prevent development in high risk areas	Conflict may arise over certain land use designations	Yes	This activity is very economically feasible and helps prevent damage to property and can help keep people from living/working in areas at risk.
Speaker series	New	Help promote understanding of different issues in minds of public	Challenging to set up and administer	No	This activity would be difficult to implement technically because of all the coordination and would not yield large benefits as there is likely not a strong desire for a speaker series from the public, so attendance may be low.

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Next Steps

1. Encourage public involvement
2. Continue to provide data discussed in committees
3. Reconvene committees near end of summer to review hazard profiles, review current mitigation activities and develop new mitigation actions
4. Reach out to Kathleen Donahue, Hope Brighton, Todd Joersz and Atkins Team for any concerns

Ice in Bismarck/Bismarck Tribune

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Questions

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Margaret Walton
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A Super Special Thanks to Our Facility Sponsor

NDARECs
North Dakota Association of Rural Electric Cooperatives
Your Touchstone Energy® Cooperative

State of North Dakota Enhanced Mitigation Plan

Risk Assessment Meeting, June 21, 2023

Timestamp	Name	Agency/Department	Position	Email Address	Phone number
Online Attendees					
2023/06/21 12:08:01 PM AST	Amanda Lee	NOAA/National Weather Service Grand Forks	Service Hydrologist	amanda.lee@noaa.gov	
2023/06/21 11:54:31 AM AST	Brenton Nesemeier	NDHHS	Director of Field Services	Bnesemeier@nd.gov	
2023/06/21 11:54:24 AM AST	Catelin Newell	ND Department of Trust Lands	Director of Admin Services & IT	cnewell@nd.gov	
2023/06/21 11:56:20 AM AST	Charlie Bahnson	ND Game and Fish	Veterinarian	cbahnson@nd.gov	
2023/06/21 11:54:01 AM AST	Danni Pinnick	NDHHS Disease Control	Immunization Surveillance Coordinator	dpinnick@nd.gov	
2023/06/21 12:05:50 PM AST	Darin Langerud	NDDWR	Division Director	dlangerud@nd.gov	
2023/06/21 12:02:50 PM AST	Darren Brostrom	Job Service / Unemployment Insurance	Director	dbrostro@nd.gov	

Timestamp	Name	Agency/Department	Position	Email Address	Phone number
2023/06/21 12:56:45 PM AST	David Bruschwein	NDDEQ/Division of Municipal Facilities	Division Director	dbruschw@nd.gov	
2023/06/21 11:54:16 AM AST	Dawn Moen	OMB-Risk Management	Loss Control Analyst	dmmoen@nd.gov	
2023/06/21 11:53:51 AM AST	Jeff Thompson	NDDES	Hazardous Chemical Officer	jathompson@nd.gov	
2023/06/21 11:56:56 AM AST	Jim Kaiser	NWS	WCM	james.kaiser@noaa.gov	
2023/06/21 11:53:49 AM AST	Kimberly Robbins	LaMoure County	Emergency Manager/911 Coordinator	krobbins@nd.gov	
2023/06/21 11:54:09 AM AST	Kirk Hagel	DES/ NDSLIC	Chief of Operations/ Deputy Director	kihagel@nd.gov	
2023/06/21 11:54:09 AM AST	Kyle Linker	NDIT	Information Security Officer	klinker@nd.gov	
2023/06/21 12:09:48 PM AST	Larry Regorrah	NDDES	Exercise Officer	lregorrah@nd.gov	
2023/06/21 12:56:35 PM AST	Lindsay Wold	NDBCI/NDSLIC	SSA / Director	liwold@nd.gov	
2023/06/21 12:05:59 PM AST	Lorna Meidinger	SHSND	Lead Historic Preservation Specialist	lbmeidinger@nd.gov	
2023/06/21 11:57:40 AM AST	Natasha Peterson	NDIT	Business Resilience Coordinator	nampeterson@nd.gov	

Timestamp	Name	Agency/Department	Position	Email Address	Phone number
2023/06/21 11:57:14 AM AST	Roxanne Anderson	NDDES / PA & Mitigation	PA Specialist	roxanneanderson@nd.gov	
2023/06/21 12:57:01 PM AST	Sean Johnson	ND Parks and Recreation Department	Planning and Projects Division Chief/Emergency Manager	Seajohnson@nd.gov	
2023/06/21 11:54:29 AM AST	Wanda Braton	USDA - Farm Service Agency	Conservation/Livestock Disaster Program Director	wanda.braton@usda.gov	
2023/06/21 12:00:00 PM AST	Tyler Spomer	NDDWR	NFIP Coordinator	tlspomer@nd.gov	
In-Person Attendees					
	Amy Metz	KX News	Reporter	ametz@kxnet.com	
	Bradley Darr	NDDOT	State Maintenance Engineer	bdarr@nd.gov	
	Brenda Vossler	NDDES	EMAP Co-Accreditation Manager	blvossler@nd.gov	
	Carl Meyer	NDDES	Hazard Mitigation Specialist	carlmeyer@nd.gov	
	Christina Ruemmod	NDAREC		croemmich@ndarec.com	
	Chuck Hyatt	NDDEQ		chyatt@nd.gov	
	Clint Fleckenstein	NDDES			
	Dan Krueger	NDSLIC		dpkrueger@nd.gov	
	Darin Hanson	NDDES	Homeland Security Division Director	dthanson@nd.gov	
	Debbie LaCombe	NDDES	Preparedness Chief	dlacombe@nd.gov	

Timestamp	Name	Agency/Department	Position	Email Address	Phone number
	Eric Jensen	NDDES	Strategic Communications Chief	ericjensen@nd.gov	
	Ethan Andres	NDDOA		eandress@nd.gov	
	Fred Anderson	North Dakota	Geologist	fjanderson@nd.gov	
	Greg Gust	NDDES	Meteorologist	ggust@nd.gov	
	Hope Brighton	NDDES	Mitigation Planning Specialist	hopebrighton@nd.gov	
	Jeff Schild	National Weather Service-Bismarck	Lead Forecaster/Assistant WCM	jeffrey.schild@noaa.gov	
	Jennifer Skjod	NDDEQ		jskjod@nd.gov	
	Justin Messner	NDDES	Recovery Chief	jmessner@nd.gov	
	Kathleen B. Donahue	NDDES	Deputy Planning Chief	kdonahue@nd.gov	
	Katie Leitch	NDDES		katieleitch@nd.gov	
	Kayla Ver Helst	BND		keverhelst@nd.gov	
	Luke McComan	ND Army National Guard		luke.m.mccoman.mil@army.mil	
	Margaret Kukcok	NDDOH		mrkukcok@nd.gov	
	Mary Senger	Burleigh County and Emmons County	Emergency Manager	msenger@nd.gov	
	Michael Gill	Civil Air Patrol	Admin	michael.gill@ndcap.us	
	Michael Ziesch	Department of Mineral Resources	Staff Officer	mdziesch@nd.gov	
	Mike Kisse	NDDOT	Assistant Division Director - Maintenance	mkisse@nd.gov	

Timestamp	Name	Agency/Department	Position	Email Address	Phone number
	Mike McHugh	ND Aeronautics Commission	Education Coordinator	mmchugh@nd.gov	
	Nick Bendickson	NDDWR		nickbendickson@gmail.com	
	Nita Ritzke	American Red Cross	Volunteer	nita.ritzke2@redcross.org	
	Russ Korzeniewski	NDHHS	Disaster Preparedness Administrator	rkorzeniewski@nd.gov	
	Sean Johnson	ND Parks and Recreation Department	Planning and Projects Division Chief/Emergency Manager	Seajohnson@nd.gov	
	Tanner Vegledahl	NDARNG		tanner.p.vegledahl.mil@army.mil	
	Todd Joersz	NDDES	State Hazard Mitigation Officer	tjoersz@nd.gov	
	Tyler Weigel	NDBOR		tweigel@usbr.gov	

AGENDA

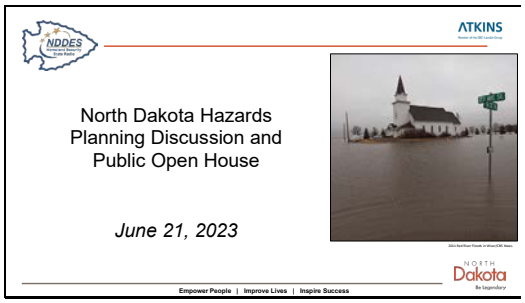
State of North Dakota Hazards Planning Discussion and Open House

June 21, 2023

10.	Welcome
11.	Presentation by State of ND Department of Emergency Services
12.	Discussion / Questions?
13.	Open House

C.6.2 Slide Decks

Slide 1



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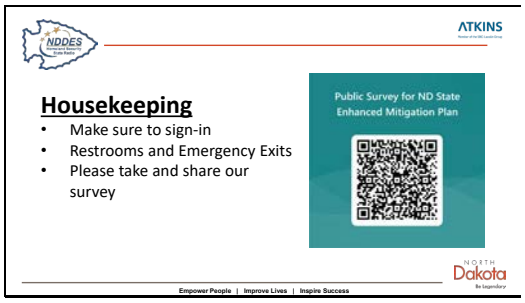

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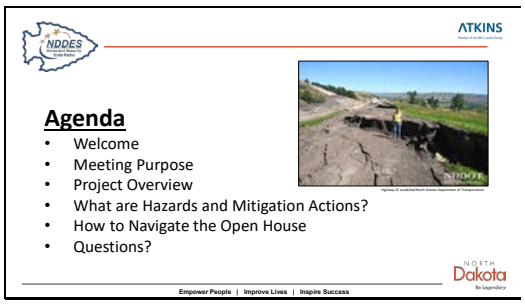
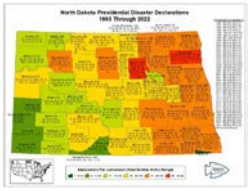


Slide 4

Welcome

Kathleen Donahue, Deputy Planning Chief

North Dakota Department of Emergency Services (ND DES)



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Slide 5

Meeting Purposes

- Introduce the State's effort to update its enhanced hazard mitigation plan
- Gather feedback on the types of disasters and other threats community members are concerned about
- Learn about community members' disaster experiences
- Share and gather ideas for mitigation actions

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Slide 6

State Enhanced Mitigation Plan Update Project

- North Dakota has a plan to help prevent lives and property from being damaged and impacted by disasters and other threats. It is called the State Enhanced Mitigation Plan.
- This plan must be updated every 5 years.
- Updating the plan involves:
  - Assessing what disasters and other threats pose a risk to communities, and
  - Identifying actions that can be taken to mitigate (reduce or eliminate) those risks to keep people and property safe.

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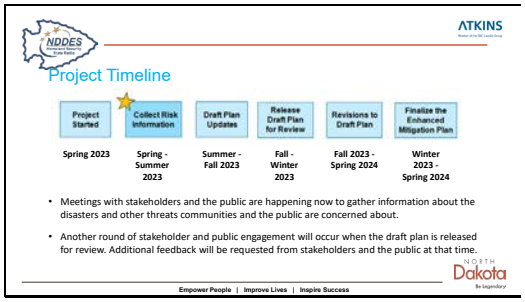
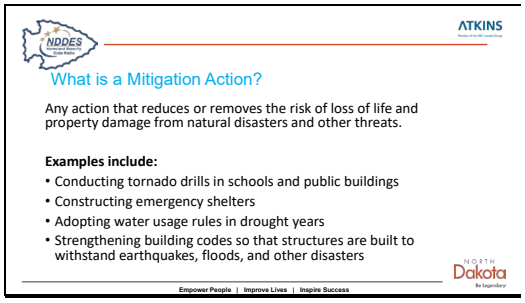
Slide 7



Slide 8

Slide 9



Slide 10

How to Navigate the Open House

Information and feedback boards are setup around the room:

- Read the information boards
- Use the feedback boards to:
  - Tell us what hazards and threats concern you most
  - Share your disaster stories or experiences
  - Share your mitigation action ideas
- Take the survey
- Younger attendees can enjoy the kids' coloring table

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Slide 11

Questions?

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Slide 1

North Dakota Hazards Planning Discussion and Public Open House

June 21, 2023

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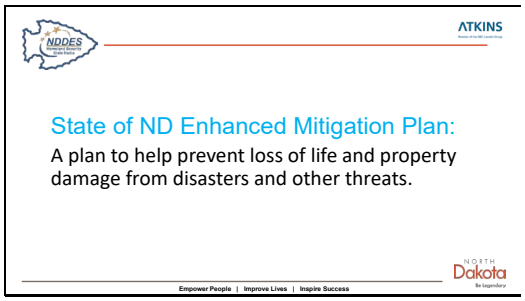
Slide 2

Slide 3



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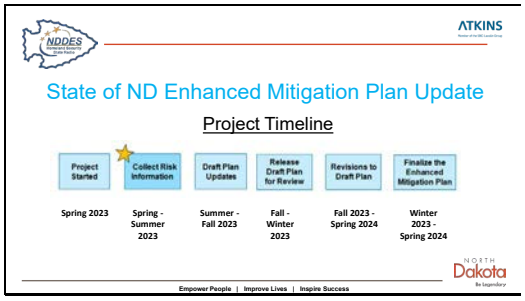

Slide 5

We Want Your Feedback!

Public Engagement:

- Meetings with stakeholders and the public are happening now.
- A public survey has been launched.
- More stakeholder and public meetings will happen when the draft of the updated plan is released for review.

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Slide 6

What is a Hazard or Threat?

A **natural** or human-made (**technological** or **adversarial**) source of danger that can cause harm to people and damage property.

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Slide 7

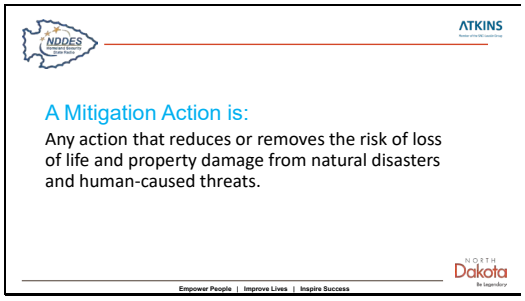
Natural Hazards:

- Flood
- Summer Severe Weather
- Winter Severe Weather
- Drought
- Geologic Hazards
- Wildfire/Urban Fire
- Infectious Diseases and Pest Infestations

Slide 8

Slide 9

Slide 10



Slide 11

Mitigation Action Examples

- Putting up flood warning signs
- Tornado drills in schools and public buildings
- Constructing emergency shelters
- Water usage rules in drought years
- Requiring structures to be built to withstand earthquakes, floods, and other disasters

Slide 12

How to Navigate the Open House

Information and feedback boards are setup around the room:

- Read the information boards
- Use the feedback boards to:
  - Tell us what hazards and threats concern you most
  - Share your disaster stories or experiences
  - Share your mitigation action ideas
- Take the survey
- Younger attendees can enjoy the kids' coloring table

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Slide 13

Please take our survey!

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C.6.3 Attendance

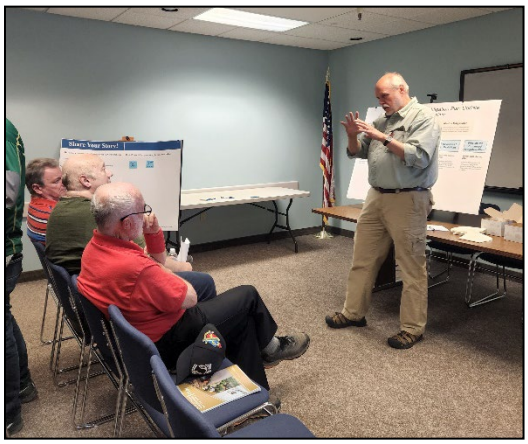
STATE OF NORTH DAKOTA HAZARDS PLANNING DISCUSSION AND PUBLIC OPEN HOUSE – JUNE 21, 2023

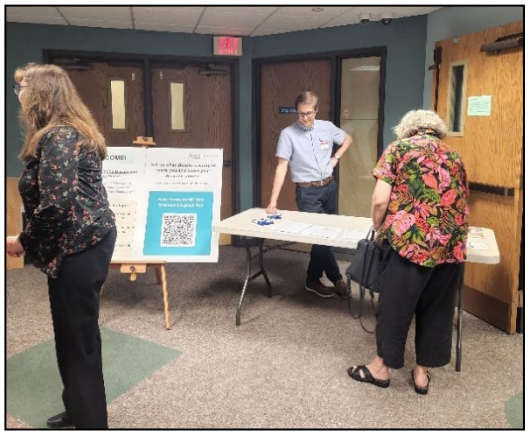
Name	Address (Optional)	Email Address (Optional)	Do You Want to be Notified About Future Meetings? (Yes / No)
Krista Dooley	140 [illegible] Rd	fundooley@gmail.com	yes
PAUL NEILAN	1954 1st STREET #390, HIGHLAND PK, IL 60035		No
Katie Leitch	223 W. Front Ave Bismarck ND 58504	Katieleitch@nd.gov	yes
MARV ABRAHAM	6050 93rd ST SE BISMARCK ND 58504		yes
Sam Kroll			no
Gary Stockert		gstockert@bismarcknd.gov	yes
Amanda Jensen	Mandan, ND	amjensen01@gmail.com	
Alex Jensen	Mandan, ND		yes

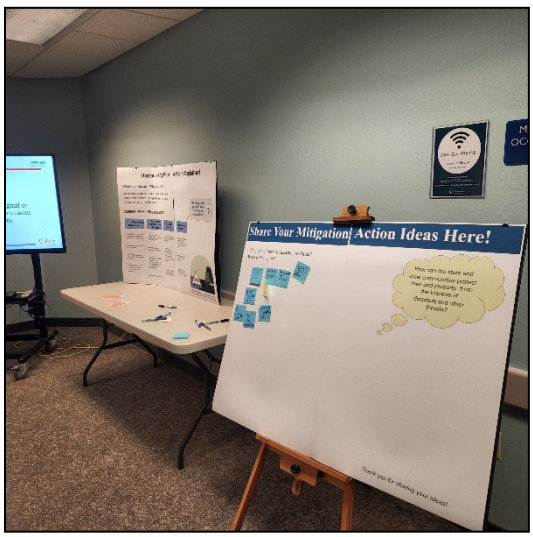
STATE OF NORTH DAKOTA HAZARDS PLANNING DISCUSSION AND PUBLIC OPEN HOUSE – JUNE 21, 2023

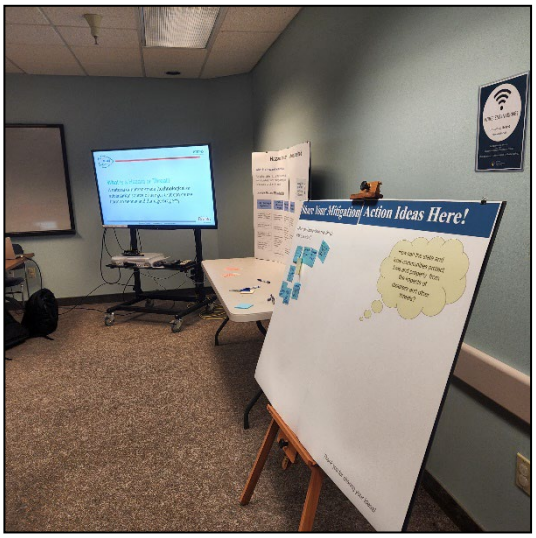
Name	Address *(Optional)*	Email Address *(Optional)*	Do You Want to be Notified About Future Meetings? (Yes / No)
RYAN THOMPSON	805 N GRIFFIN BISMARCK ND 58501		
Josh Loosmore	5601 GOLD DRIVE BISMARCK ND 58503	JLoosmore@nd.gov	Yes
Brenda Vossler	3841 Knudsen Ave		
Janell Quinlan	3823 East Princeton Ave Bis. ND 58504	jquinlane heartlandconsultants.org	yes
Eric Jensen	1309 18th St SE Mandan, ND 58554	eric.jensen@nd.gov	
Carl Meyer	[redacted] Bismarck	carlmeyer@nd.gov	Y
Todd Joersz	Mandan	tjoersz@nd.gov	

C.6.4 Photos






Share Your Mitigation Action Ideas Here!


Share Your Mitigation Action Ideas Here!


Share Your Story!


Hazards

C.7 TAC Mitigation Strategy Guidance Meeting

C.7.1 Agenda

State of North Dakota Enhanced Mitigation Mission Area Operations Plan
Technical Advisory Committee Meeting
November 1, 2023

Click here to join the meeting
Meeting ID: 245 761 047 426
Passcode: qoJRHB
Or call in (audio only)
+1 701-328-0950,,296499992# United States, Fargo

ITEM	DESCRIPTION	PRESENTERS
1.	Welcome and Introductions	Kathleen Donahue, ND Project Co-Lead, NDDES-HLS Sean M. Johnson, Chief, Planning and Projects Division, NDDPR
2.	Meeting Purpose and Guidance • Virtual, November 8, 2023, 9 to 11:30 a.m. • Agenda Items • Disseminate Mitigation Actions, Mitigation Strategy, Annual Report	Kathleen Donahue, ND Project Co-Lead, NDDES-HLS Sean M. Johnson, Chief, Planning and Projects Division, NDDPR Heather Allemang, Mitigation Planner, Atkins
3.	Mitigation Strategy Review • Short-term strategies • Long-term strategies	Sean M. Johnson, Chief, Planning and Projects Division, NDDPR Heather Allemang, Mitigation Planner, Atkins
4.	Evaluations of Current Mitigation Goals and Objectives • Review of goals and associated objectives • Review of recommendations • Refinement of goals and objectives	Heather Allemang, Mitigation Planner, Atkins
5.	Mitigation Action Development and Discussion	Kathleen Donahue, Sean Johnson, Heather Allemang
6.	Next Steps	Kathleen Donahue

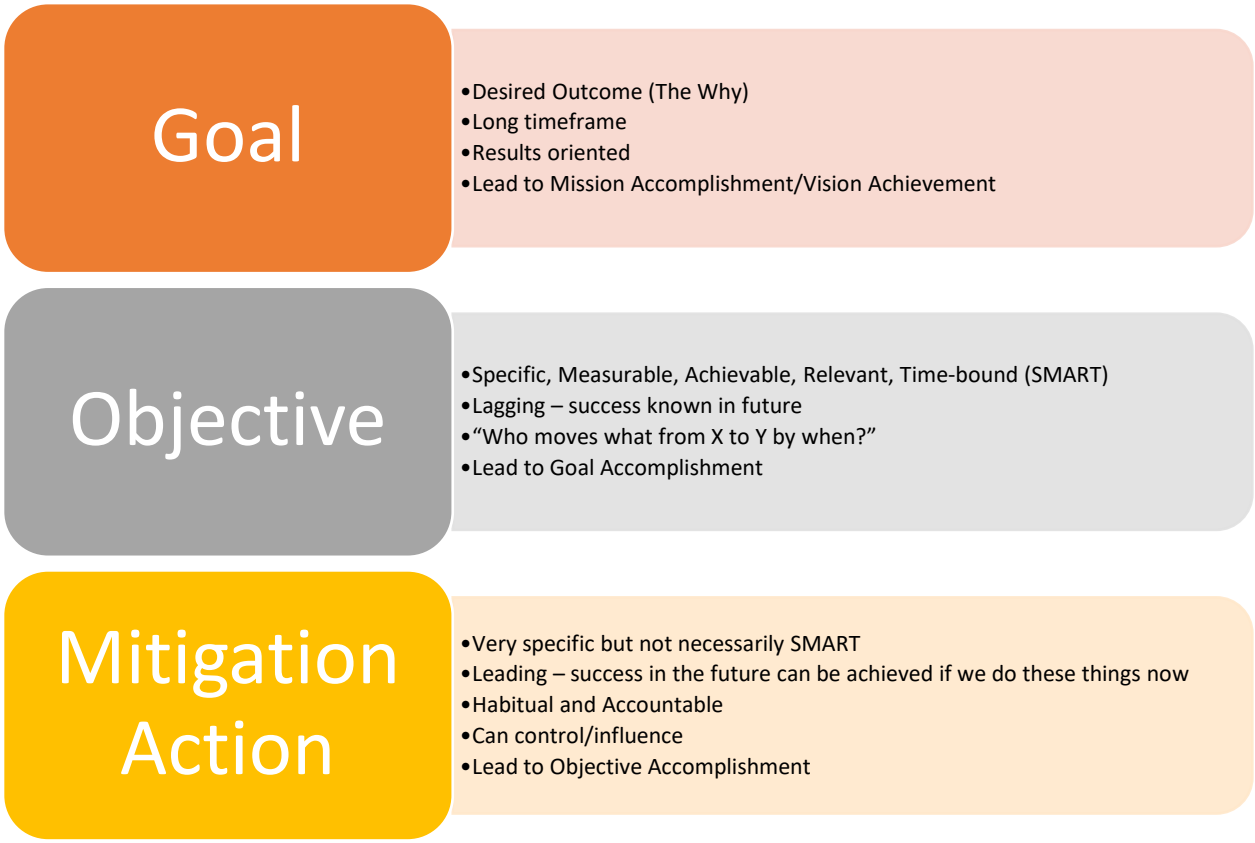
C.7.2 Meeting Notes

Meeting Narrative

The NDDES SHMT Technical Advisory Committee Meeting was held as a hybrid meeting (virtually and in-person) on November 1st at 1:30 PM. The meeting was attended by NDDES staff, the SHMT, NDDES's consultant group, Atkins, and two of FEMA Region VIII's Community Planners. The intent of this meeting was to identify adjustments to the current goals and objectives of the Enhanced State Hazard Mitigation Plan.

Sean Johnson, the Chief of Planning and Projects Division for ND Parks and Recreation, facilitated an opening presentation for the meeting. Sean has an extensive background in strategic planning and because of his past staff time serving with the Department of Emergency Services, it was felt he could offer valuable guidance as the committee began having discussions on updating the plan's goals and objectives.

Understanding the goals and objectives is critical for the SHMT, and subsequently the hazard committees, as they are the foundation for developing mitigation actions. Mitigation actions will be the driving source of resilience building for the state for the duration of the plan, or the next five years, and the state's plan is a vital source of reference for all local county, city, and tribal jurisdictions development of their own plan updates. Mr. Johnson summarized goals, objectives, and mitigation actions as follows:



Current Assessment

The current plan has a total of four goals and ten objectives. North Dakota has a mitigation program that is performing well, and it was discussed at length that the revisions to the goals and objectives need to acknowledge what is working and going to be maintained about the program while also setting new goals, improving in weaker areas, and expanding in other key areas. The committee discussed at length changes in priority to include equity in the delivery of grant funded projects and services, developing and deepening partnerships, mitigation for the whole community, and challenging all state departments to think about how nature-base solutions can further supplement their projects.

Conclusion

The committee successfully reviewed and revised their four existing goals. Hope Brighton, Mitigation Planning Specialist at NDDES, motioned that a new, fifth goal be added to specifically focus on the topic of nature-base solutions given the importance of the topic, the rapidly expanding growth of the topic, and the breadth of the topic. After discussion from the committee, it was agreed and supported that this was an acceptable addition and it strategically worked well to be a separate goal opposed to an objective within one of the four goals. Additionally, the SHMT decided in addition the having a purpose statement they would also add a Mitigation Vision Statement, which reads “North Dakota is the most disaster resilient state in the nation”.

C.7.3 Slide Deck

Slide 1

Slide 2

Slide 3

Slide 4

Goals and Lagging Objectives Review

Slide 5

MITIGATION VISION AND STRATEGY

- **Mitigation Vision:** North Dakota is the most disaster resilient state in the nation
- **Overall Strategy:**
  - State Hazard Mitigation Team-developed statewide, comprehensive program
  - Articulate the strategy in the form of goals and short/long term lagging objectives
  - Align leading mitigation actions against lagging objectives

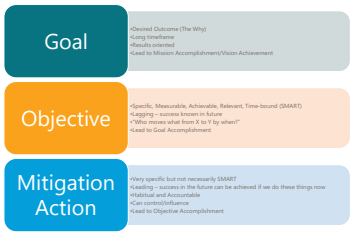
Slide 6

STRATEGIES

Short Term Lagging Objectives	Long Term Lagging Objectives
▪ Expect substantial completion within plan timeframe ▪ Implemented promptly after plan approval ▪ Maintain many established/successful leading mitigation actions	▪ Do not expect completion within plan timeframe ▪ Leading mitigation actions over next 5 years set conditions for eventual completion ▪ May involve new approaches/addressing emerging concerns

Slide 7

ARCHITECTURE



Slide 8

EXAMPLE

Slide 9

EXAMPLE, CON'T

- If I consistently take these leading actions (mitigation actions),
  - I can reasonably predict I will accomplish the lagging objective they support (each done in concert consistently can reasonably be assime
  - Confirmed by stepping on the scale in 6 mos and noting I am 50 lbs lighter (the lagging indicator… success is confirmed after the actions are taken).
- I can control or heavily influence all the leading actions in some way on a habitual basis which I can also hold myself accountable to.

Slide 10

Preferred purpose slide

Slide 11

C.7.4 Attendance

SHMT Technical Advisory Meeting-November 1, 2023, 1:30pm

Name	Dept/Org	Phone Number	Email Address
Alexis Faber	Department of Water Resources		Afaber@nd.gov.
Ariana Borrello	FEMA Region VIII		ariana.borrello@fema.dhs.gov
Brenda Vossler	NDDES		blvossler@nd.gov
Carrie Beth Lasley	Atkins		carrie.lasley@akinsglobal.com
Corey King	NOAA, NWS Bismarck, ND		corey.king@noaa.gov
Gregory Gust	NDDES		ggust@nd.gov
Heather Allemang	Atkins		Heather.Allemang@atkinsrealis.com
Hope Brighton	NDDES		hopebrighton@nd.gov
Justin Messner	NDDES		jmessner@nd.gov
Kathleen Donahue	NDDES		kdonahue@nd.gov
Katie Leitch	NDDES		katieleitch@nd.gov

Name	Dept/Org	Phone Number	Email Address
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Laura Ackerman	Department of Water Resources		lcackerman@nd.gov
Logan Sand	FEMA RVIII		logan.sand@fema.dhs.gov
Margaret Walton	Atkins		margaret.walton@atkinsglobal.com
Russ Korzeniewski	Department of Health and Human Services		rkorzeniewski@nd.gov
Sean Johnson	ND Parks and Recreation Department		Seajohnson@nd.gov
Shawn Kessel	Commerce		skessel@nd.gov
Todd Joersz	NDDES		tjoersz@nd.gov

C.8 SHMT Mitigation Strategy Meeting

C.8.1 Agenda

State of North Dakota Enhanced Mitigation Plan

Mitigation Strategy Meeting

November 8, 2023, 9:00 a.m.

Meeting Purpose: Discuss the current status of the enhanced mitigation plan update project; provide an overview of the final priority risk index; the need for a mitigation strategy; and how to develop a strategy and mitigation actions within it.

Microsoft Teams Meeting
Click here to join the meeting

ITEM	DESCRIPTION	PRESENTERS
7.	Welcome and Overview • Annual Report	Justin Messner, Disaster Recovery Chief, NDDES
8.	Project Status • PRI Overview	Carrie Beth Lasley, PhD, Senior Planner II, Atkins Project Co-Lead Margaret Walton, CFM, Deputy Project Manager, Atkins
9.	The Need for a Mitigation Strategy	Logan Sand, Senior Community Planner, FEMA Region VIII
10.	Developing Mitigation Actions	Sean Johnson, Planning Chief, ND Parks and Recreation Atkins
11.	Committee Breakouts • Each participant will move into a virtual breakout room per hazard committee	NDDES and Atkins
12.	Outreach Efforts	Hope Brighton, NDDES Hazard Mitigation Planner
13.	Project Schedule	Atkins
14.	Questions/Concerns	Justin Messner

C.8.2 Meeting Notes

Meeting Narrative

Welcome and Introduction

Justin – Intro and Welcome

Margaret and Carrie Beth – Mitigation Strategy and Updated Priority Risk Index

Logan Sand – Importance of Mitigation

Sean – Presentation regarding formatting goals and objectives

Break Out Committee Rooms

Next Steps and Timeline

The NDDES Mitigation Action Planning Meeting was held virtually on Wednesday November 8th at 9:00AM and concluded at 11:30AM.

Project Overview and Current Status

As a refresher, Hazard Mitigation Plans are FEMA-approved documents that require updating every 5 years to remain in effect.

NDDES has been conducting hazard committee meetings in preparation for this plan update. These meetings provide local expertise and input from relevant state officials that NDDES utilizes in the research phase of plan development.

Outreach Strategy and Public Involvement Activities

Engaging the general public is a federal planning requirement, and also a valuable insight in understanding citizen's level of awareness and personal preparedness when it comes to hazards. During this plan update, NDDES launched two public surveys, one for the general public and one specifically for first responders and emergency management staff. The NDDES planning team also engaged with partners in the university, library, and oil and gas sectors, for example, to gain diverse perspectives. The team hosted Community Coffees and public open house meetings that were family friendly, including preparedness related coloring activities for young children. The team strived to gain diverse input to gather whole community perspective while updating the SHMP.

Risk Assessment Findings

North Dakota addresses 14 individual hazards grouped into natural hazards, technological hazards, and adversarial threats.

Natural Hazards	Technological Hazards	Adversarial Hazards
Flood	Dam Failure	Cyber Attack
Severe Summer Weather	Space Weather	Civil Disturbance

Severe Winter Weather	Hazardous Materials Release	Criminal, Terrorist, or Nation-State Attack
Drought	Transportation Incident	
Geologic Hazards		
Wildfire/Urban Fire		
Infectious diseases		

The hazard mitigation team presented snapshots of each individual hazard to outline the hazard history with a focus on events occurring since the last plan update (2018). In addition to hazard history, each snapshot includes a brief discussion of how climate change is expected to impact the frequency and intensity of the hazard, when applicable.

What is a Mitigation Strategy?

The Mitigation Strategy is an ongoing guide of potential future actions that can be taken to lessen the impact disasters have on people and property statewide. The Mitigation Strategy organizes actions by which agency could be the best leader for the activity, the priority, the timeline of implementation, identifies potential funding sources, and tracks progress made towards the goal over the lifespan of the plan. It defines the purpose and ties together the goals and objectives at a state level of implementation.

Developing Mitigation Actions

Developing mitigation actions first involves updating existing mitigation actions. These include actions that are identified in the previous version of the plan that may need to be updated to reflect changing conditions, new information, and/or new capabilities. As part of the plan update process, ND must provide updates to FEMA on the status of existing mitigation actions and progress made. Actions that are still incomplete may be left in place within the plan. Actions identified in the planning process that are not covered by the previous plan will become new mitigation actions. This should include any actions the state may like to see mitigation funding for in the future.

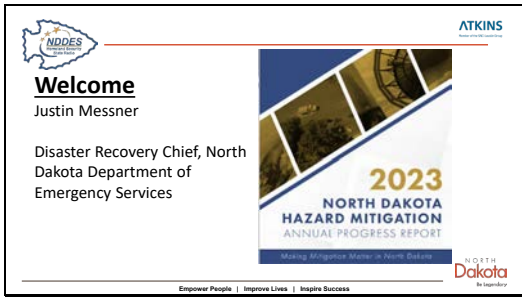
Each of the hazard specific committees met to discuss mitigation strategies. NDDES and Atkins staff members assisted each committee chair with the discussion of key findings from the risk assessment for each of the hazards. Committee members then discussed potential mitigation projects and presented those ideas for consideration. Committee members considered mitigation actions under the following categories: Planning and Regulatory; Structural and Infrastructure; Nature Based; Public Education, Technical Assistance, and Partnerships; and Other Mission Areas.

At the meeting's conclusion, NDDES extended its gratitude for the State Hazard Mitigation Team and its willingness to make substantial contributions to keeping North Dakota safer.

C.8.3 Slide Deck

Slide 1

Slide 2



Slide 3

Slide 4

Housekeeping

Make sure to sign-in

- North Dakota Enhanced Mitigation MAOP Update Mitigation Strategy Meeting Sign In - 11/8/2023 (google.com)

If you did NOT fill out the survey for a breakout room, please do so.

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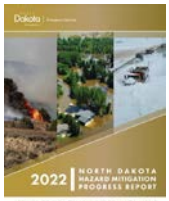
Slide 5

Mitigation at Work

- Direct Technical Assistance
- Plan Developers Meetings
- Community Coffees
- Annual Reports – Sharing Your accomplishments
- Reviewing Local Plans – Based on Your Area of Expertise



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Slide 6

Mitigation at Work

- 457 Mitigation Projects since 1997
- Savings of $6.54 per $1 invested
- $1.8 billion in savings

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Slide 7

Project Overview and Status

- Carrie Beth Lasley, Co-Project Lead
Carrie.Lasley@atkinsglobal.com

- Margaret Walton, Co-Project Lead
Margaret.Walton@atkinsglobal.com

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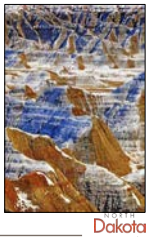
Slide 8

Current Committees

- Technical Advisory Committee – Overall guidance for plan, program development and implementation
- Hazard and Threat Committees – Provide expertise to analyze hazards and threats and identify mitigation actions to reduce risk
- Planning Committees – Address issues specific to mitigation planning concerns and program implementation, such as climate change



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Slide 9

Hazards and Threats

Natural Hazards	Technological Hazards	Adversarial Threats
• Flood	• Dam Failure	• Cyber Attack
• Summer Severe Weather	• Space Weather	• Civil Disturbance
• Winter Severe Weather	• Hazardous Materials Release	• Criminal Attack
• Drought	• Transportation Incident	• Terrorist or Nation-State Attack
• Geologic Hazards		
• Wildfire/Urban Fire		
• Infectious Diseases and Pest Infestations		

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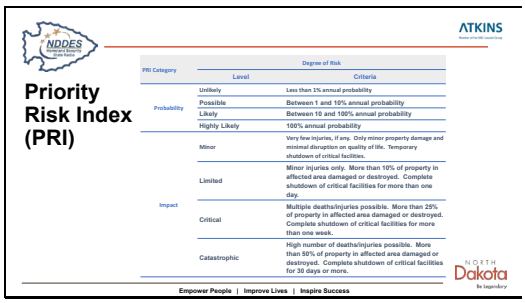
Slide 10



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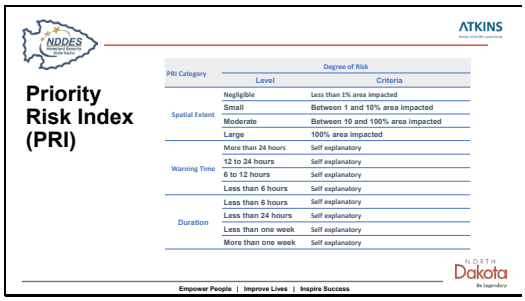

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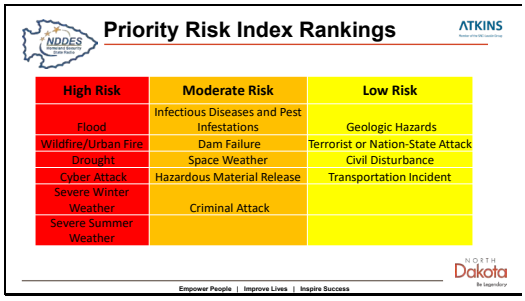

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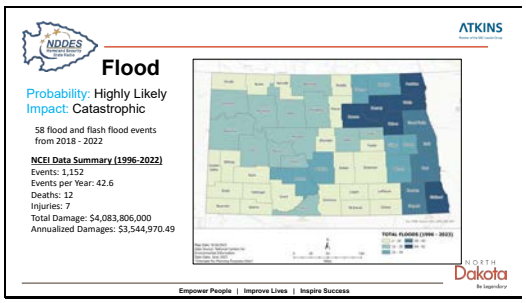

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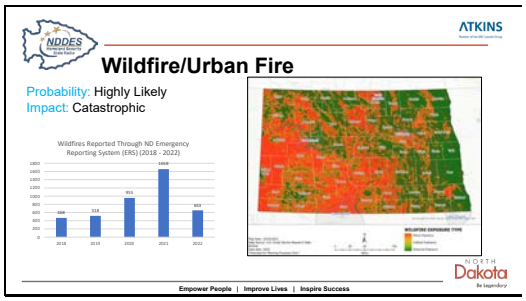

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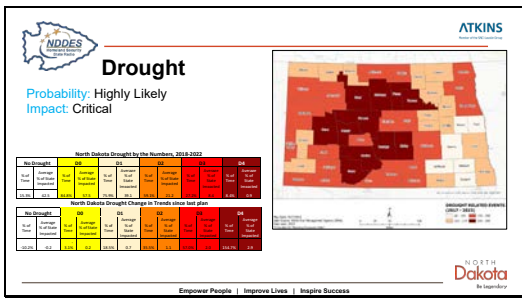

Slide 16

ATKINS

Severe Winter Weather

Probability: Highly Likely
Impact: Limited

Annualized Consequences from Severe Winter Weather

Type of Event	Probability	Annualized Damages			
		Deaths	Injuries	Property Damage	Crop Damage
Blizzard	95.0 per year	0.4	3.8	$ 10,450,000	$ -
Winter Storm	67.8 per year	0.2	0.8	$ 1,536,808	$ -
Extreme Cold/Wind Chill	64.8 per year	0.08	0	$ -	$ -
Heavy Snow	48.9 per year	0	0	$ 348,269	$ 15,385
Cold/Wind Chill	19.2 per year	0.3	0.08	$ 13,846	$ 2,885
Ice Storm	4.6 per year	0	0	$ 3,857,692	$ -
Frost/Freeze	2.8 per year	0.04	0.1	$ 577	$ -
Freezing Fog	0.2 per year	0.04	0	$ 14,808	$ -

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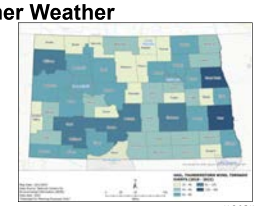
Slide 17

ATKINS

Severe Summer Weather

Probability: Highly Likely
Impact: Limited



Magnitude	Frequency	Annualized Damages			
		Deaths	Injuries	Property Damage	Crop Damage
EF0/F0	13.4 per year	0.0	53.6	$ 121,103.99	$ 117,107,558.00
EF1/F1	5.4 per year	0.0	140.4	$ 330,425.45	$ 128,865,924.00
EF2/F2	2.0 per year	0.0	136	$ 489,911.37	$ 71,527,060.00
EF3/F3	0.6 per year	0.0	22.8	$ 437,743.90	$ 17,947,500.00
EF4/F4	0.2 per year	0.1	20.6	$ 844,646.43	$ 11,825,050.00
EF5/F5	0.04 per year	0.0	0.5	$ 340,000.00	$ 102,000.00
All Tornados		**0.2**	**373.9**	**$ 2,563,831.14**	**$ 347,375,092.00**

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ATKINS

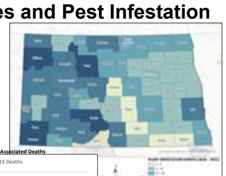
Infectious Diseases and Pest Infestation

Probability: Highly Likely
Impact: Limited

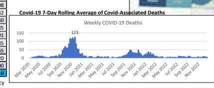
Crop Insurance Indemnity Amounts for Pest and Plant Disease 2018-2022

Commodity	Amount	Annualized
Corn	$ 781,492.60	$ 156,298.52
Soybeans	$ 2,183,065.79	$ 436,613.16
Wheat	$ 14,350,926.92	$ 2,870,185.38
Canola	$ 3,425,755.80	$ 685,151.16
Dry Beans	$ 31,287.00	$ 6,257.40
Dry Peas	$ 1,805,804.85	$ 361,160.97
Sunflowers	$ 2,167,386.22	$ 433,477.24
Sugar Beets	$ 1,183,449.90	$ 236,689.98
Barley	$ 614,127.10	$ 122,825.42
Potatoes	$ 462,507.00	$ 92,501.40
Flax	$ 662,529.25	$ 132,505.85
Oats	$ 194,094.55	$ 38,818.91
Forage Production	$ 207,099.25	$ 41,419.85
Buckwheat	$ 22,973.25	$ 4,594.65
Mustard	$ 176,346.00	$ 35,269.20
Forage Seeding	$ 1,650.00	$ 330.00
Total	**$ 28,270,495.48**	**$ 5,654,099.10**

USDA Risk Management Agency



Covid-19 7-Day Rolling Average of Covid-Associated Deaths



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Dam Failure

Probability: Likely
Impact: Minor

- 54 are High-Hazard Potential Dams, which are those most likely to put a population at risk.
- FEMA Hazard Mitigation Assistance Program focused on reducing this hazard.
- Potential mitigation action discussion

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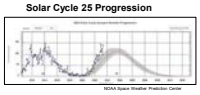
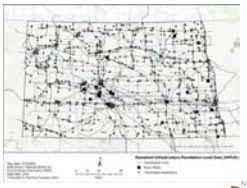
Slide 20

Space Weather

Probability: Possible
Impact: Limited

Solar Cycle 25 Progression





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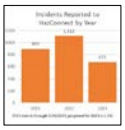
Hazardous Materials Release

Probability: Likely
Impact: Limited



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Slide 22

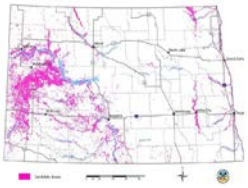
Geologic Hazards

Probability: Possible
Impact: Limited

Crop Insurance Indemnity Amounts for Earthquakes, 2018-2022

Commodity	Amount	Annualized
Corn	$ 25,199.50	$ 5,039.90
Soybeans	$ 22,756.00	$ 4,551.20
Wheat	$ 62,911.00	$ 12,582.20
Dry Beans	$ 23,130.00	$ 4,626.00
Dry Peas	$ 6,170.00	$ 1,234.00
Barley	$ 978.00	$ 195.60
Total	$ 141,144.50	$ 28,228.90

USDA Risk Management Agency



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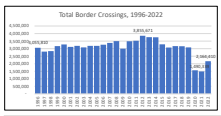
Adversarial Threats

Criminal, Terrorist or Nation-State Attack, or Civil Disturbance

Probability: Unlikely
Impact: Critical; Limited for Civil Disturbance



Bureau of Transportation Statistics

Terrorist Screening Center Encounters, 2018-2022

County	Encounters
Cass	1
Ramsey	1
Ward	1
Stark	1
Burleigh	1
Dunn/Ina	1
Williams	1
Unknown	1

North Dakota State and Local Intelligence Center

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Cyberattack

Probability: Likely
Impact: Minor

North Dakota Department of Information Technology

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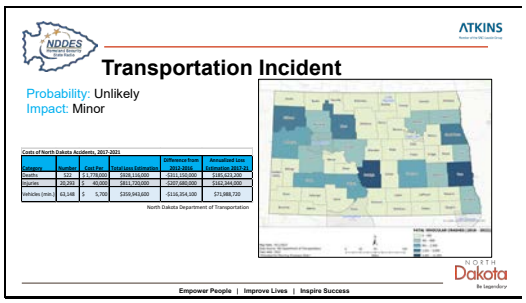
Slide 25



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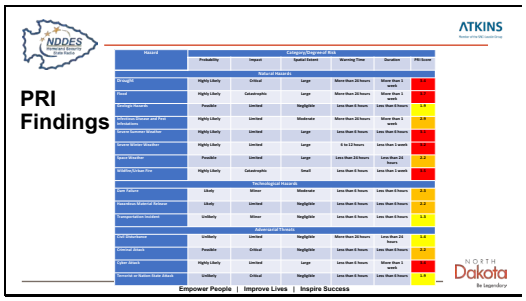

Slide 27

Slide 28

What is a Mitigation Strategy?

- Provide a framework for the State
- Includes:
  - Mitigation Vision
  - Purpose
  - Strategy
    - Short and Long-term
  - Goals
  - Objectives

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Slide 29

Hazard Mitigation Techniques

Prevention

Property Protection

Natural Resources Protection

Structural Projects

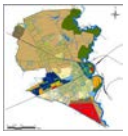
Emergency Services

Public Education and Awareness

Slide 30

Prevention

- Planning and zoning
- Building codes
- Open space preservation
- Floodplain regulations
- Stormwater management regulations
- Drainage system maintenance
- Capital improvements programming
- Setbacks



Slide 31

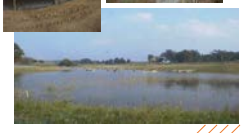
Property Protection

- Acquisition
- Relocation
- Building elevation
- Critical facilities protection
- Retrofitting
- Safe rooms, shutters, shatter-resistant glass
- Insurance

Slide 32

Natural Resource Protection

- Floodplain protection
- Watershed management
- Riparian buffers
- Forest management
- Erosion and sediment control
- Wetland preservation and restoration
- Habitat preservation



Slide 33

Structural Projects

- Reservoirs
- Dams, levees, dikes
- Floodwalls
- Stormwater Diversions
- Detention / Retention Basins
- Channel Modification
- Storm Sewers

Slide 34

Emergency Services

- Emergency response equipment
- Shelter Operations
- Evacuation planning & management
- Emergency response training & exercises
- Sandbagging for flood protection
- Installing temporary shutters




Slide 35

Public Education and Awareness

- Outreach projects
- Speaker series / demonstration events
- Hazard map information
- Real estate disclosure
- Library materials
- School children educational programs
- Hazard expositions

Slide 36

Mitigation Goals

Goal 1: Elevate hazard mitigation planning for state, local, and tribal jurisdictions.

Goal 2: Enhance and expand public education and understanding of natural hazard risks and vulnerabilities within a changing climate, and the importance of developing effective mitigation and adaptation solutions within the whole community.

Goal 3: Improve disaster resilience to current and future buildings, structures, and infrastructure systems.

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Mitigation Goals

Goal 4: Support a multi-sectoral mitigation approach from natural and technological hazards, and adversarial threats equitably through enhanced application of grant funding.

Goal 5: Incorporate nature based and climate adaptation solutions into cost-effective, environmentally sound, and feasible mitigation projects and actions.

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Mitigation Strategy: Two Step Process

1. Update Existing Mitigation Actions

- Actions that are already in your current plan.
- You may keep these in place if they are incomplete.
- Annual mitigation updates have been **completed** and utilized.
- Committee leads/chairs have copies.

State Hazard Mitigation Report 2023.pdf (nd.gov)

*It is ok if no progress has been made, but we need to state that in the plan!

2. Develop New Mitigation Actions

- Actions that are not in your current plan.
- Your plan should include any actions you might want to use mitigation dollars for in the future or FEMA won't fund.

*If you want a building code program, generators, storm shelters or to elevate homes, etc. you need an action in the plan.

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Current Mitigation Actions

* 2018 Plan

Action ID #	Action Title	Action (Statement)	2018 Action Description	Goal and Objective ID	Potential Funding	Implementation Timeline	2018 Status	Priority	Agency
			the State's building code program, and samples of best practices.						
2016-3	Building Codes and Zoning Ordinances	Encourage local jurisdictions to develop and update building codes and zoning ordinances.	Building codes and zoning ordinances promote mitigation principles by outlining requirements and restrictions to keep communities safer. Examples include: • Floodplain ordinances • Defensible space (fire prevention) • Snow load building requirements.	3.2	Existing State and Federal Budgets/ Programs	Ongoing	Ongoing - Already initiated and continuing	Low	NDDAC (Lead); NDDES
2016-4	Cultural and Historical Preservation	Promote the participation of cultural and historical preservation organizations in the planning process.	This Whole Community action calls for leveraging the expertise of cultural and historical preservation organizations when analyzing risk and vulnerability and identifying mitigation measures designed to protect cultural and historical resources.	1.4	Existing State and Federal Budgets/ Programs	Ongoing	Ongoing - Already initiated and continuing	Medium	NDDES (Lead); SHSND; NDSU Extension Service

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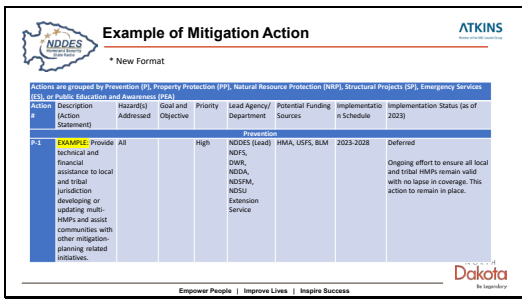

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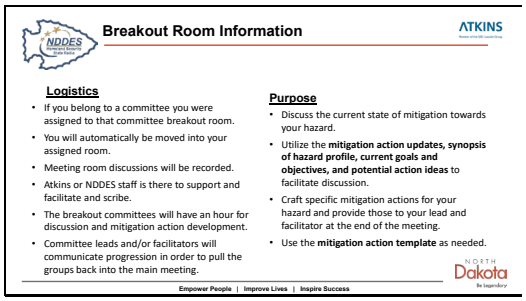

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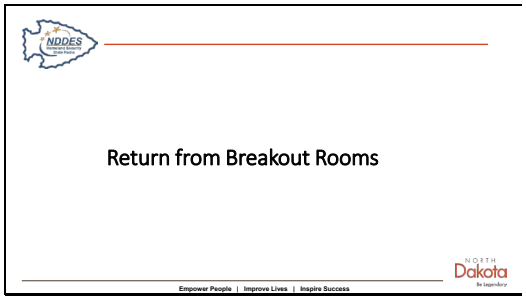

Slide 43

Ongoing Public Involvement

- Public Meeting tomorrow in Barnes County
- Social Media Postings
- Local Staff and Public Surveys
- Ongoing Community Coffees
- Integration with other planning and emergency management efforts

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Project Schedule

1. Public Meeting, November 9, 2023, Barnes County
2. Draft Plan for public review
3. Submission to FEMA on December 1, 2023
4. FEMA Review and Feedback
5. Revisions implemented
6. Plan adopted

Ice in Bismarck/Bismarck Tribune

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Tasks and Next Steps

1. Final revisions and feedback on hazard profiles by Friday, November 10
2. Final mitigation action ideas by Friday, November 10
3. Reach out to Kathleen Donahue, Hope Brighton, Todd Joersz and Atkins Team for any concerns

Ice in Bismarck/Bismarck Tribune

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Slide 47

Questions
Kathleen Donahue
kdonahue@nd.gov

Carrie Beth Lasley
Carrie.Lasley@atkinsrealis.com

Margaret Walton
Margaret.Walton@atkinsrealis.com

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C.8.4 Attendance

Mitigation Strategy Meeting-November 11, 2023, 9:00am

Name	Dept/Org	Phone Number	Email Address
Alexander Burke	Atkins		Alexander.burke@atkinsrealis.com
Brenda Vossler	NDDES		blvossler@nd.gov
Carrie Beth Lasley	Atkins		Carrie.lasley@atkinsrealis.com
Clint Fleckenstein	NDDES		clintfleckenstein@nd.gov
Eric Upton	NDDES		eupton@nd.gov
Hope Brighton	NDDES		hopebrighton@nd.gov
Jason Stanley	NDDES		jestanley@nd.gov
Justin Messner	NDDES		jmessner@nd.gov
Kathleen Donahue	NDDES		kdonahue@nd.gov
Katie Leitch	NDDES		katieleitch@nd.gov
Margaret Walton	Atkins		Margaret.Walton@atkinsrealis.com
Todd Joersz	NDDES		tjoersz@nd.gov
Alexis Faber	NDDES		afaber@nd.gov
Amanda Bakken	HHS		ajbakken@nd.gov
Amanda Lee	NOAA/NWS Grand Forks		amanda.lee@noaa.gov
April Walker	Barr Engineering		awalker@barr.com
Ariana Borrello	FEMA Region 8		ariana.borrello@fema.dhs.gov

Name	Dept/Org	Phone Number	Email Address
Beau Peterson	USDA - Farm Service Agency		beau.peterson@usda.gov
Ben Faul	DCS / Commerce		bfaul@nd.gov
Brad Darr	NDDOT		bdarr@nd.gov
Christopher Parisien	Turtle Mountain Band of Chippewa Indians		chris.parisien@tmbci.org
Corey King	NOAA's NWS Bismarck		corey.king@noaa.gov
Dan Murphy	ND National Guard		daniel.m.murphy7.mil@amry.mil
Darin Langerud	ND DWR		dlangerud@nd.gov
Dawn Moen	OMB-Risk Management		dmmoen@nd.gov
Debbie LaCombe	NDDES		dlacombe@nd.gov
Fred Anderson	North Dakota Geological Survey		fjanderson@nd.gov
Gary Stockert	Bismarck Emergency Management		gstockert@bismarcknd.gov
George Gerhardt	NDHHS Health Response and licensure		ggerhardt@nd.gov
Gregory Gust	NDDES		ggust@nd.gov
Jacob Hall	Bureau of Reclamation		jmhall@usbr.gov
Jeff Schild	National Weather Service-Bismarck		jeffrey.schild@noaa.gov
Jerry Dodds	North Dakota Army national Guard		jerold.l.dodds.mil@army.mil
Jim Kaiser	NWS Grand Forks		james.kaiser@noaa.gov
Juli Sickler	NDDHHS		jsickler@nd.gov

Name	Dept/Org	Phone Number	Email Address
Karen Goff	ND DWR		kgoff@nd.gov
Kirby Kruger	HHS		kkruger@nd.gov
Kirk Hagel	DES/SLIC		kihagel@nd.gov
Kyle Erickson	North Dakota Center for People with Disabilities		kyle.erickson.1@MinotStateU.edu
Laura Ackerman	ND Department of Water Resources		lcackerman@nd.gov
Laura Horner	Department of Water Resources		lmhorner@nd.gov
Lindsay Wold	NDSLIC/NDBCI		liwold@nd.gov
Logan Sand	FEMA Region 8		logan.sand@fema.dhs.gov
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Mary Senger	Burleigh County Emergency Management		msenger@nd.gov
Mike Kisse	NDDOT		mkisse@nd.gov
Miranda Meehan	NDSU Extension		miranda.meehan@ndsu.edu
Natasha Peterson	NDIT		nampeterson@nd.gov
Neil Johnson	NDDES		neiljohnson@nd.gov
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Name	Dept/Org	Phone Number	Email Address
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Russ Korzeniewski	ND DHHS		rkorzeniewski@nd.gov
Ryan Duletski	North Dakota Highway Patrol		rduletsk@nd.gov
Sean Johnson	ND Parks and Recreation Department		seajohnson@nd.gov
Traci Redlin	South Central Dakota Regional Council		tredlin@scdrc.org
Tyler Spomer	ND Department of Water Resources		tlspomer@nd.gov
Wanda Braton	ND Farm Service Agency		wanda.braton@usda.gov

AGENDA

State of North Dakota Hazards Planning Discussion and Open House

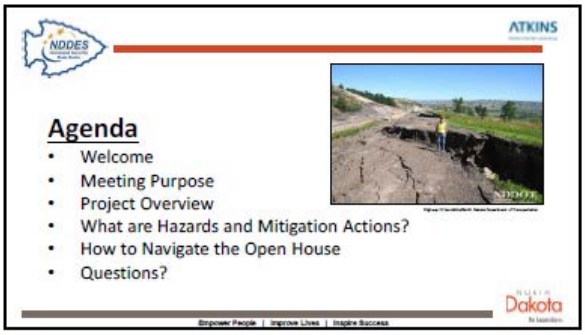
November 9, 2023

1	Welcome
2	Presentation by State of ND Department of Emergency Services
3	Discussion / Questions?
4	Open House

C.10. Plan Review Meeting

The slides below showcase the presentation that was presented at the Valley City Eagles Club on November 9, 2023. Meeting attendees discussed the threat of dam failures and shared local stories and concerns about pending threats.

1

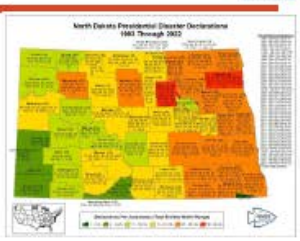


2

Welcome

Hope Brighton, Mitigation Planning Specialist

North Dakota Department of Emergency Services (NDDES)



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4

Meeting Purposes

- Introduce the State's effort to update its enhanced hazard mitigation plan
- Explain mitigation actions
- Share and gather ideas for mitigation actions

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5

State Enhanced Mitigation Plan Update Project

- North Dakota has a plan to help prevent lives and property from being damaged and impacted by disasters and other threats. It is called the State Enhanced Mitigation Plan.
- This plan must be updated every 5 years.
- Updating the plan involves:
  - Assessing what disasters and other threats pose a risk to communities, and
  - Identifying actions that can be taken to mitigate (reduce or eliminate) those risks to keep people and property safe.

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6

Project Timeline

- Information has been gathered about the disasters and other threats communities and the public are concerned about.
- ND DES is collecting feedback from communities and the public on mitigation actions the state can take to prevent damage to lives and property from disasters and other threats.

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7

Hazards: Disasters and Threats Covered by the Plan

Natural Hazards	Technological Hazards	Adversarial Threats
• Flood	• Dam Failure	• Cyber Attack
• Summer Severe Weather	• Space Weather	• Civil Disturbance
• Winter Severe Weather	• Hazardous Materials Release	• Criminal, Terrorist or Nation-State Attack
• Drought	• Transportation Incident	
• Geologic Hazards		
• Wildfire/Urban Fire		
• Infectious Diseases and Pest Infestations		

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8

What is a Mitigation Action?

Any action that reduces or removes the risk of loss of life and property damage from natural disasters and other threats.

Examples include:

- Conducting tornado drills in schools and public buildings
- Constructing emergency shelters
- Adopting water usage rules in drought years
- Strengthening building codes so that structures are built to withstand floods and other disasters

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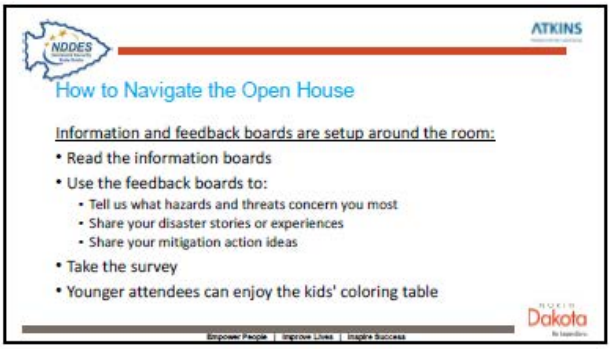
9


NDDES
ATKINS
How to Navigate the Open House
Information and feedback boards are setup around the room:
• Read the information boards
• Use the feedback boards to:
• Tell us what hazards and threats concern you most
• Share your disaster stories or experiences
• Share your mitigation action ideas
• Take the survey
• Younger attendees can enjoy the kids' coloring table
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10


NDDES
ATKINS
Questions?
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11

November 9, 2023 - Attendee list.

STATE OF NORTH DAKOTA HAZARDS PLANNING DISCUSSION AND PUBLIC OPEN HOUSE – JUNE 21, 2023

Name	Address *(Optional)*	Email Address *(Optional)*	Do You Want to be Notified About Future Meetings? (Yes / No)
Jessica Jenrich		jjenrich@barnescounty.us	Yes
Jennifer Schultes	Jamestown, ND	director@scvcc.org	yes
[illegible]	Valley City, ND	trpub@times-online.com	yes
Bill Brown	NDDES	babrown@nd.gov	yes
Andrew Kirking		akirking@stutsman	sure
Kathleen Donahue	NDDES	kdonahue@nd.gov	Sure
Brenda Vossler	NDDES	blvossler@nd.gov	
[illegible]	GF, ND	gjguste@gmail.com	Y

Hope Heather

NDDES Atkins

1

C.11 Committee Report

Committee	Meeting Dates		
Flood	6/8/2023	10/23/2023	
Fire	6/19/2023	10/31/2023	
Drought	6/1/2023	10/27/2023	
Adversarial Threats	6/7/2023		
Severe Winter Weather	6/1/2023	10/30/2023	
Severe Summer Weather	5/31/2023	10/30/2023	
Infectious Diseases	5/31/2023		
Dam Failure	6/8/2023	10/27/2023	
Hazardous Material Release	6/7/2023		
Space Weather	6/5/2023	10/20/2023	
Geologic Hazards	6/7/2023		
Transportation Incident	6/5/2023	10/11/2023	
Climate Change	2/6/2023	5/18/2023	9/21/2023
Critical Infrastructure	5/12/2023	6/25/2023	9/3/2023
Outreach and Tactical Communication	5/4/2023	5/9/2023	5/25/2023
Oil & Gas	5/17/2023		
Tribal-Local Planning	5/18/2023		

C.12 Additional Statewide Mitigation Related Projects, Meetings, and Organizations

Project/Meeting/ Organization	Partners*	Frequency of Meetings or Project Duration	Purpose
American Association of State Highway and Transportation Officials (AASHTO)	ND Department of Transportation Federal Highway Administration Transportation Research Board	Annual meeting with committee meetings throughout the year.	Scope of many of the AASTHO Committees related directly to mitigation and resiliency. NDDOT has representation on committees discussing resiliency and other FHWA initiatives related to mitigation.
Annual Operating Plan Meetings (James River and Missouri River)	Bureau of Reclamation USACE NWS Bismarck NDDWR Local emergency management officials	Annually	Review annual operating plans with local stakeholders. Analyzes potential impact and mitigation measures related to potential dam failure and flooding.
Blue Cross Blue Shield Meridian Health	BCBS NDHHS	Long term, quarterly	Enhancement of the North Dakota Immunization Information System.
Community Planning Group	NDHHS Community-Based Organizations Affected community	Long term, quarterly	Promote the prevention of bloodborne infections, share best practices for community education and prevention activities. Serve as a conduit to the at-risk population.
Department of Emergency Services Advisory Committee	NDDES ND Peace Officers Association ND Emergency Management Association ND Association of Counties ND League of Cities ND 911 Association ND Fire Services ND Emergency Medical Services Association ND Health and Human Services ND Sheriff's and Deputies Association ND Hospital Association	Twice per year	Provides a direct communication link among NDDES and supported and supporting agencies, and organizations for the purpose of providing advice and feedback on the strategic direction of the Department, including the mitigation section. The committee also ensures the agency is prepared to respond and to mitigate natural and technological hazards and adversarial threats.

Project/Meeting/ Organization	Partners*	Frequency of Meetings or Project Duration	Purpose
	ND Bureau of Criminal Investigation **or** ND Highway Patrol (rotate every 4 years) ND State Interoperable Executive Committee ND Indian Affairs Commission ND Department of Public Instruction ND Department of Transportation ND VOAD ND INFRAGARD ND Information Technology		
Devils Lake Joint Water Board	DLJWD NWS Grand Forks Representatives of water districts	Monthly	Ongoing Flood Mitigation
Devils Lake Outlets Management	ND Governor's Office NDDES NWS Grand Forks Local and tribal representatives	Various	Ongoing Flood Mitigation
Emergency Action Plan Tabletop Exercises for Various Dams	Dam Owner NDDWR North Dakota Silver Jackets USACE USBOR USFWS Local Water Resource Districts NWS Grand Forks and Bismarck Local Emergency Managers Local Law Enforcement USFWS	Varies – typically once approximately every 5 years for a given dam	To familiarize participants with the dam, the contents of the EAP, and their roles and responsibilities during an emergency at the dam.
Emergency Medical Services Advisory Council	EMS Association NDHHS ND Legislative Representative	Long term, quarterly	Response coordination and sustainability. Training for infectious disease transport and mass casualty.

Project/Meeting/ Organization	Partners*	Frequency of Meetings or Project Duration	Purpose
	Office of Rural Health NDHA Local EMS Agencies		
HIV/Hepatitis Stakeholders	NDHHS UND Center for Rural Health Board of Pharmacy DHS-Behavioral Health NDAG Indian Affairs Commission Local Public Health	New, quarterly, and short term	To review available data and assess vulnerability related to bloodborne pathogen outbreaks in North Dakota counties
Immunization Advisory Committee	NDHHS Local Public Health Private health Third party payers	Long term, monthly	Provide updates and share best practices and provide guidance to NDHHS.
Influenza Surveillance and Response	USDA NDHHS NDGF NDDA USFWS	Long term, annually	Review and sharing of influenza related activities that were conducted are that are being planned.
International Souris River Board (ISRB)	NDGF NDDWR NDHHS NWS Bismarck North Central River Forecast Center Environment and Climate Change Canada USFWS USACE USGS	Meet (face to face) minimum twice a year; conference calls are more frequent and are held to support the ISRB agenda and mission	Provides international collaboration on common issues regarding the Souris/Mouse River which is an international body of water.
International Souris River Study Board – Resource and Agency Advisory Group	NDDWR ND State Engineer NDGF USFWS USACE Canadian agencies (Department of Fisheries and Oceans, Environment and Climate Change Canada, Agriculture and Agri-Food Canada)	Work completed; active throughout the past five years	Created by the Study Board to understand how the modification of the operating plan may affect use of the river. RAAG serves as a conduit for communication with stakeholders regarding the study process; identifies potential conflicts with policies or interests; suggests ideas or approaches to improve the results of the

Project/Meeting/ Organization	Partners*	Frequency of Meetings or Project Duration	Purpose
	Saskatchewan and Manitoba agencies Souris River Joint Board City of Minot City of Estevan City of Weyburn Sask Power		study; and ensures all business needs and risks of interest to the study are accounted for and appreciated.
Local Emergency Planning Commissions	NWS Bismarck and Grand Forks NDDES Local Officials	At least twice per year	Mandated by federal government to enhance preparedness and response to hazardous materials incidents, these groups are often leveraged by emergency managers to discuss hazard mitigation plans.
Multi-State Partnership meeting	AZ, CO, IL, IN, IA, KS, KY, MI, MN, MO, NE, NM, NC, ND, OH, OK, SD, TX, WI Departments of Agriculture, State Animal Health Officials, Divisions of Emergency Management, USDA APHIS, USDA FSIS, State Universities and other industry representatives	Monthly conference call, annual meeting; ongoing	Interstate and interagency awareness, resource sharing, emergency planning and response
NOAA-Climate Program Office-Sectoral Applications Research Program James River Stakeholder Advisory Team	NDDES NDSU State Climatologist Office ND Department of Agriculture US Geological Survey National Weather Service USDA NRC National Drought Mitigation Center The Center for Research on the Changing Earth Systems Farm Service Agency North Dakota Soybean Council	Short-term project in 2018 with meetings as needed	The James River Stakeholder Advisory Team (referenced as the Drought Stakeholder Advisory Team in 2014 - 2016 Progress Report: Hazard Mitigation in North Dakota) provided feedback on the Decadal Drought Risk Assessment and Scenario Development for food and bio-fuels Agriculture in Four Sub-basins in the Missouri River Basin. The Team defined decadal drought information needs of agricultural stakeholders and participated in a scenario-planning exercise. Project

Project/Meeting/ Organization	Partners*	Frequency of Meetings or Project Duration	Purpose
	South Dakota State Climatologist Office		lead applying for additional funding to expand the scope of the study. Data from the drought profile was used by to support development of the study profile.
North Branch Antelope Creek Watershed Plan	Pembina County Water Resource District USDA-NRCS Red River Retention Authority NDDWR USACE USDI-USFWS Richland County	As required	Locally led, public watershed planning effort on a 111,327-acre sub-watershed of the Red River to address flooding and related natural resource issues. Specific goals include reducing flood damages to agricultural land, rural residences, the community of Mooreton, and public/private transportation and drainage infrastructure.
North Branch Park River Watershed Project	Park River Joint Water Resource District USDA-NRCS Red River Retention Authority NDSWC USACE USDI-USFWS Cass County	Started October 2015, plan (EA) scheduled to be completed in June 2019. Approximately $700,000 in federal (NRCS), state (NDDWR), and local funds (RRJB, WRD) invested in technical support for the planning effort currently. Design phase for selected flood control alternatives anticipated to be 2020-2021, followed by construction.	Locally led, public watershed planning effort on a 165,245-acre sub-watershed of the Red River to address flooding and related natural resource issues. Specific goals include reducing flood damages to agricultural land, public/private infrastructure, and the community of Crystal.
North Dakota Board of Animal Health	NDDA NDHHS NDGF USFWS	Long term, quarterly	Animal regulatory authority including those designed to mitigate the spread of disease.
North Dakota Chapter of the Association for	NDAPIC NDHHS	Long term, quarterly	Share best practices, provide updates on emerging issues related to infection control.

Project/Meeting/ Organization	Partners*	Frequency of Meetings or Project Duration	Purpose
Professionals in Infection Control			
North Dakota Drought / Wildfire Readiness Level Webinars	NWS Bismarck and Grand Forks NDDES NDFS NDNG	Drought / wildfire conditions dictate meeting frequency. Meetings typically last less than 30 minutes.	Determine current and expected drought / wildfire conditions across the state. Based on the conditions, determine a Wildfire Readiness Level for state agencies to mitigate potential impacts.
North Dakota Drought / Wildfire Unified Command	NDDES Director Homeland Security Director NDDWR State Engineer ND State Forester ND Agriculture Commissioner (support agencies added as needed)	Meeting frequency by operational periods which are based drought and fire severity and response requirements	Provide analysis of drought conditions across the state, along with forecasts and outlooks of weather / climate. Recommend implementation of mitigation measures.
North Dakota Fire Council	NWS Bismarck and Grand Forks NDDES NDFS USFS BIA BLM NPS	Two regularly scheduled meetings (face to face) along with various conference calls as needed	Preparation and discussion / summary of wildfire seasons. Discussions regarding resources and fire weather expectations. NWS also provides Spot Forecasts as requested for prescribed burns (along with wildfires). Supports mitigation of fires.
North Dakota GIS Technical Committee	ND Department of Agriculture ND Army National Guard ND Department of Emergency Services ND Game & Fish Department ND Geological Survey ND Department of Health ND Information Technology Department ND Oil & Gas Division North Dakota Parks & Recreation Department	Monthly	Provide updates and gathering interagency feedback on ongoing geologic and geologic hazards mapping projects and LiDAR elevation mapping projects. Aerial imagery data acquisition and updates are also provided. This committee provides technical recommendations on how agency GIS data is produced and disseminated between agencies and the public.

Project/Meeting/ Organization	Partners*	Frequency of Meetings or Project Duration	Purpose
	ND Public Service Commission ND State Water Commission ND Department of Transportation ND Department of Trust Lands		
North Dakota Homeland Security Integration Meetings	NDDES NDDA NDHHS	Long term, quarterly	Briefings regarding homeland security issues and activities.
North Dakota Hospital Preparedness	NDHHS Hospitals Long Term Care Association Regional EPR Staff	Long term, monthly	Coordinate hospital preparedness and planning
North Dakota Infection Preventionists	Infectious disease preventionists, NDHHS	Long term, monthly	Education and community building in the area of health care infection prevention.
North Dakota Infectious Disease Specialists	Infectious disease doctors NDHHS	Long term, quarterly	Education and team building among infectious disease specialists and the department.
North Dakota State Water Commission meetings	Nine-member board, consisting of the Governor as chairman, Commissioner of Agriculture as an ex-officio member, and seven appointed members	Every 2 months (6 times per year)	Make decisions on cost-share funding for projects, including flood control projects.
North Dakota Stockmen's Association Inspectors Meeting	North Dakota Stockmen's Association Brand Inspectors and Livestock Inspectors Law Enforcement	Annual, one-day	Share inspection, livestock, and animal health information and to review related policies and laws.
North Dakota Voluntary Organizations Active in Disaster	Members of VOAD NDDHS NDDES NWS Grand Forks and Bismarck	Quarterly	Prepare for potential hazard and threat impacts; support state mitigation plan development.

Project/Meeting/ Organization	Partners*	Frequency of Meetings or Project Duration	Purpose
One Health Working Group	NDHHS NDDA NDGF USFWS	Annual meeting; conference calls as necessary; ongoing	Serve as a forum for communication and coordination concerning emerging, invasive, and infectious threats to animal and public health in North Dakota.
Red River Basin Commission Meetings	Red River Basin Commission NWS Grand Forks Representatives throughout the basin	Bi-monthly, plus Annual summit	Analyzes measures for flood damage reduction, flood mitigation projects, water quality and quantity issues.
Red River Basin Gage Cooperators	USGS NWS Grand Forks USACE NDDWR Local Stakeholders	Annual	Flood season preparation
Regional Public Health Emergency Preparedness and Response Meetings	Regional Emergency Preparedness and Response Staff NDHHS NWS Grand Forks	Long term, twice/month	Coordinate emergency public health response and planning.
Rush River Watershed Plan	Cass County Joint Water Resource District USDA-NRCS Red River Retention Authority NDDWR USACE USDI-USFWS Cass County	Started October 2015, plan (EA) scheduled to be completed in June 2019. Approximately $700,000 in federal (NRCS), state (NDDWR), and local funds (RRJB, WRD) invested in technical support for the planning effort currently. Design phase for selected flood control alternatives anticipated to be 2020-2021, followed by construction.	Locally led, public watershed planning effort on a 141,929-acre sub-watershed of the Red River to address flooding and related natural resource issues. Specific goals include reducing flood risk for the City of Armenia (certified flood protection to the 100-year) and reducing flood damages to transportation infrastructure.
Shortfoot Creek Watershed Plan	Cass County Joint Water Resource District USDA-NRCS	Started May 2016, plan (EA) scheduled to be completed in	Locally led, public watershed planning effort on a 74,247-acre sub-watershed of the

Project/Meeting/ Organization	Partners*	Frequency of Meetings or Project Duration	Purpose
	Red River Retention Authority NDDWR USACE USDI-USFWS Cass County	March 2020. Approximately $700,000 in federal (NRCS), state (NDDWR, and local funds (RRJB, WRD) invested in technical support for the planning effort currently. Design phase for selected flood control alternatives anticipated to be 2021-2022, followed by construction.	Red River to address flooding and related natural resource issues. Specific goals include reducing flood damages to agricultural land as well as public and private infrastructure.
SKYWARN Classes	NWS Bismarck and Grand Forks work with local emergency management in holding the classes	Each county typically holds them every 1 to 2 years; sometimes counties will partner with each other to hold meetings	Help train weather spotters so they can provide accurate reports of severe and hazardous weather. The classes also provide public outreach and education regarding severe summer weather and preparation for severe summer weather.
State Emergency Response Commission	Office of the Governor NDDES, Division of Homeland Security NDDES, Division of State Radio State Fire Marshal ND Department of Health Office of Management and Budget Office of the Attorney General Workforce Safety and Insurance Department of Agriculture NDDOT Office of the Adjutant General Oil and Gas Division	Quarterly	Emergency Response planning and reports related to hazardous materials; discuss spill maps, and grants.

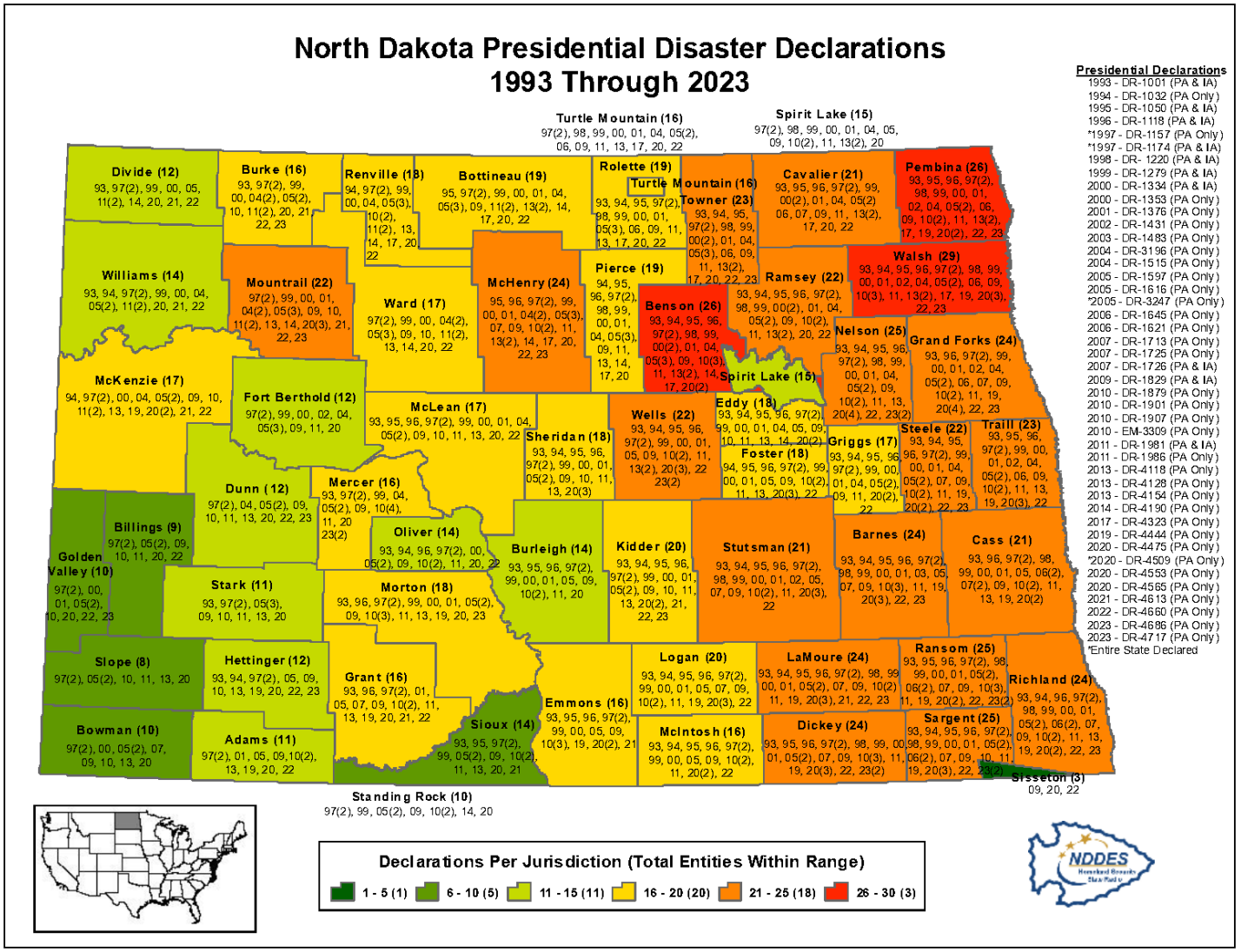
Project/Meeting/ Organization	Partners*	Frequency of Meetings or Project Duration	Purpose
	Insurance Department Dakota Plains COOP Tesoro Refinery ND Motor Carriers Association		
Statewide exercises	Federal, state, local, tribal, and private partners	Regularly throughout the year	Helps provide realistic weather scenarios for emergency preparation, response, and potential mitigation actions. Increasing emphasis of exercises on recovery and mitigation.
TB Nurses Meeting	NDHHS Local Public Health	Long term, quarterly	Review TB cases, treatment updates, investigation updates, new and emerging information.
Unified Spill Reporting	NDDES NDDA NDDEQ	As needed	Create unified spill reporting system.
United States Animal Health Association	50 states, federal government agencies and 4 foreign country leaders, and 34 allied groups representing universities, veterinarians, livestock producers, national livestock and poultry industry, laboratorians, researchers, and extension services	Annual plenary session; committee meetings and forums; monthly national calls	Protects animal and public health; develops and promotes sound animal health solutions for public good including disease eradication, emergency preparedness, response and recovery, food safety and emerging animal disease issues.
USDA APHIS VS National Training and Exercise Program	State, Territorial, Tribal and Federal Departments of Agriculture, Health and Homeland Security	Biennial multi-state exercise; ongoing	To prepare the nation for potential health emergencies that threaten the US economy or animal agriculture industries. Training and exercises help to maintain levels of preparedness and support capacity.
Weather Ready Nation (WRN)	All levels of government	Information provided to WRN Ambassadors can vary, but	Recognizes NOAA partners who are improving the nation's readiness,

Project/Meeting/ Organization	Partners*	Frequency of Meetings or Project Duration	Purpose
Ambassador Program		generally information is sent by NOAA / NWS during Severe Summer Weather and Winter Weather Awareness Campaigns	responsiveness, and overall resilience against extreme weather, water, and climate events.

*Listing of partner agencies is based on best available information.

Appendix D. Background Appendices

D.1 Disaster Declarations Map



D.2 North Dakota Presidential Disaster Declarations

Disaster No.	Declaration Date	Name	Incident Dates	Declaration Type
4509	4/1/2020	COVID-19 PANDEMIC	1/20/2020	Major Disaster
3512	3/13/2020	COVID-19	1/20/2020	Emergency
4553	7/9/2020	FLOODING	4/1/2020 to 4/25/2020	Major Disaster
4686	2/5/2023	SEVERE WINTER STORM, SNOWSTORM, AND STRAIGHT-LINE WINDS	11/9/2022 to 11/11/2022	Major Disaster
3477	3/13/2020	COVID-19	1/20/2020	Emergency
4475	1/21/2020	FLOODING	10/9/2019 to 10/26/2019	Major Disaster
4323	7/12/2017	FLOODING	3/23/2017 to 4/29/2017	Major Disaster
4565	10/2/2020	SEVERE STORMS AND FLOODING	6/29/2020 to 7/1/2020	Major Disaster
4128	7/12/2013	SEVERE STORMS AND FLOODING	5/17/2013 to 6/16/2013	Major Disaster
4190	8/19/2014	SEVERE STORMS AND FLOODING	6/25/2014 to 7/1/2014	Major Disaster
4118	5/29/2013	FLOODING	4/22/2013 to 5/16/2013	Major Disaster
3364	4/26/2013	FLOODING	4/22/2013 to 5/7/2013	Emergency
4154	10/31/2013	SEVERE WINTER STORM	10/4/2013 to 10/5/2013	Major Disaster
4123	6/25/2013	SEVERE STORMS AND FLOODING	5/25/2013 to 6/1/2013	Major Disaster
3309	3/14/2010	FLOODING	2/26/2010 to 4/30/2010	Emergency
1907	4/30/2010	FLOODING	2/26/2010 to 7/15/2010	Major Disaster
3318	4/7/2011	FLOODING	4/5/2011 to 7/1/2011	Emergency
1986	5/20/2011	SEVERE WINTER STORM	4/29/2011 to 5/1/2011	Major Disaster
1901	4/21/2010	SEVERE WINTER STORM	4/1/2010 to 4/2/2010	Major Disaster
3247	9/13/2005	HURRICANE KATRINA EVACUATION	8/29/2005 to 10/1/2005	Emergency
1376	5/28/2001	SEVERE STORMS, FLOODING, & GROUND SATURATION	3/1/2001 to 8/9/2001	Major Disaster

Disaster No.	Declaration Date	Name	Incident Dates	Declaration Type
1353	12/29/2000	SEVERE WINTER STORMS AND TORNADOES	11/1/2000 to 11/20/2000	Major Disaster
1879	2/26/2010	SEVERE WINTER STORM	1/20/2010 to 1/25/2010	Major Disaster
1279	6/8/1999	SEVERE STORMS, FLOODING, SNOW, ICE, GROUND SATURATION, LANSLIDES, MUDSLIDES, AND TOR	3/1/1999 to 7/19/1999	Major Disaster
1829	3/24/2009	SEVERE STORMS AND FLOODING	3/13/2009 to 8/10/2009	Major Disaster
1220	6/15/1998	FLOODING, GROUND SATURATION, SEVERE STORMS	3/2/1998 to 7/18/1998	Major Disaster
1174	4/7/1997	SEVERE FLOODING, SEVERE WINTER STORMS, SNOWMELT, SPRING RAINS	2/28/1997 to 5/24/1997	Major Disaster
1001	7/26/1993	SEVERE STORMS & FLOODING	6/22/1993 to 7/15/2007	Major Disaster
1725	9/7/2007	SEVERE STORMS AND TORNADOES	7/15/2007	Major Disaster
825	5/8/1989	FLOODING	3/29/1989 to 5/8/1989	Major Disaster
1726	9/7/2007	SEVERE STORMS AND TORNADOES	8/26/2007 to 8/27/2007	Major Disaster
1713	7/17/2007	SEVERE STORMS AND FLOODING	6/2/2007 to 6/18/2007	Major Disaster
469	5/24/1975	FLOODING FROM RAINS & SNOWMELT	5/24/1975	Major Disaster
581	4/26/1979	SEVERE STORMS, SNOWMELT & FLOODING	4/26/1979	Major Disaster
2435	6/29/2002	ND - AGAIN FIRE - 06/29/2002	6/29/2002 to 7/3/2002	Fire Suppression
3012	4/13/1976	SEVERE FLOODING	4/13/1976	Emergency
554	4/17/1978	STORMS, ICE JAMS, SNOWMELT & FLOODING	4/17/1978	Major Disaster
3016	7/21/1976	DROUGHT	7/21/1976	Emergency
434	5/14/1974	HEAVY RAINS, SNOWMELT & FLOODING	5/14/1974	Major Disaster
3065	7/7/1978	SEVERE STORMS & TORNADOES	7/7/1978	Emergency
501	4/16/1976	FLOODING	4/16/1976	Major Disaster
475	7/11/1975	SEVERE STORMS & FLOODING	7/11/1975	Major Disaster
287	6/5/1970	SEVERE STORMS & FLOODING	6/5/1970	Major Disaster
216	3/23/1966	FLOODING	3/23/1966	Major Disaster
335	6/10/1972	SEVERE STORMS & FLOODING	6/10/1972	Major Disaster
79	6/22/1957	TORNADO	6/22/1957	Major Disaster
195	5/10/1965	FLOODING	5/10/1965	Major Disaster

Disaster No.	Declaration Date	Name	Incident Dates	Declaration Type
256	4/18/1969	FLOODING	4/18/1969	Major Disaster
220	7/9/1966	SEVERE STORMS & FLOODING	7/9/1966	Major Disaster
1981	5/10/2011	FLOODING	2/14/2011 to 7/20/2011	Major Disaster
4660	7/13/2022	SEVERE WINTER STORM AND FLOODING	4/22/2022 to 5/25/2022	Major Disaster
1645	6/5/2006	SEVERE STORMS, FLOODING, AND GROUND SATURATION	3/30/2006 to 4/30/2006	Major Disaster
4613	9/1/2021	SEVERE STORM, STRAIGHT-LINE WINDS, AND FLOODING	6/7/2021 to 6/11/2021	Major Disaster
658	5/11/1982	FLOODING	5/11/1982	Major Disaster
4444	6/12/2019	FLOODING	3/21/2019 to 4/28/2019	Major Disaster
1616	11/21/2005	SEVERE WINTER STORM AND RECORD AND/OR NEAR RECORD SNOW	10/4/2005 to 10/6/2006	Major Disaster
1621	1/4/2006	SEVERE WINTER STORM	11/27/2005 to 11/29/2005	Major Disaster
1597	7/22/2005	SEVERE STORMS, FLOODING, AND GROUND SATURATION	6/1/2005 to 7/7/2005	Major Disaster
1483	8/1/2003	SEVERE STORMS AND HIGH WINDS	6/24/2003 to 6/25/2003	Major Disaster
3196	4/2/2004	SNOW	1/23/2004 to 1/27/2004	Emergency
1431	9/10/2002	SEVERE STORMS, FLOODING AND TORNADOES	6/8/2002 to 8/11/2002	Major Disaster
1515	5/5/2004	SEVERE STORMS, FLOODING, AND GROUND SATURATION	3/26/2004 to 6/14/2004	Major Disaster
1334	6/27/2000	SEVERE STORMS, FLOODING AND GROUND SATURATION	4/5/2000 to 8/12/2000	Major Disaster
1157	1/12/1997	SEVERE WINTER STORMS AND BLIZZARD CONDITIONS	1/3/1997 to 1/31/1997	Major Disaster
1118	6/5/1996	SEVERE STORMS, FLOODING, AND ICE JAMS	3/12/ to 6/21/1996	Major Disaster
1050	5/16/1995	SEVERE STORMS, FLOODING, AND GROUND SATURATION	3/1/1995 to 7/5/1995	Major Disaster
1032	7/1/1994	SEVERE STORMS, FLOODING	3/5/1994 to 8/5/1994	Major Disaster
3061	2/16/1978	BLIZZARD & SNOWSTORMS	2/16/1978	Emergency

Source: FEMA, 11/2023

D.3 Population Projections by County

County	2010	2020	2025	2030	2035	2040	Change 2020-2040
Adams	2,343	2,368	2,303	2,230	2,155	2,081	-287
Barnes	11,066	11,062	10,836	10,636	10,454	10,259	-803
Benson	6,660	7,322	7,655	8,111	8,577	9,018	1,696
Billings	783	987	1,077	1,134	1,177	1,217	230
Bottineau	6,429	6,768	6,748	6,725	6,684	6,627	-141
Bowman	3,151	3,367	3,419	3,467	3,555	3,603	236
Burke	1,968	2,481	2,663	2,833	2,978	3,106	625
Burleigh	81,308	97,770	105,006	109,327	112,098	114,018	16,248
Cass	149,778	182,259	199,713	212,952	223,469	232,293	50,034
Cavalier	3,993	3,771	3,588	3,480	3,404	3,344	-427
Dickey	5,289	5,027	4,817	4,695	4,610	4,542	-485
Divide	2,071	2,510	2,685	2,799	2,886	2,954	444
Dunn	3,536	4,882	5,431	5,841	6,163	6,431	1,549
Eddy	2,385	2,299	2,241	2,250	2,271	2,296	-3
Emmons	3,550	3,324	3,150	3,062	3,013	2,978	-346
Foster	3,343	3,336	3,293	3,284	3,292	3,291	-45
Golden Valley	1,680	1,924	2,030	2,099	2,144	2,176	252
Grand Forks	66,861	74,366	78,271	82,834	86,222	89,398	15,032
Grant	2,394	2,392	2,345	2,320	2,300	2,286	-106
Griggs	2,420	2,222	2,065	1,951	1,842	1,743	-479
Hettinger	2,477	2,713	2,779	2,859	2,938	3,022	309
Kidder	2,435	2,453	2,398	2,334	2,270	2,209	-244
LaMoure	4,139	4,106	4,014	3,951	3,909	3,872	-234
Logan	1,990	1,912	1,868	1,876	1,902	1,935	23
McHenry	5,395	6,125	6,405	6,609	6,746	6,848	723
McIntosh	2,809	2,603	2,407	2,271	2,169	2,101	-502
McKenzie	6,360	14,586	18,800	21,976	24,485	26,683	12,097
McLean	8,962	9,894	10,192	10,405	10,504	10,570	676
Mercer	8,424	8,930	8,901	8,858	8,777	8,675	-255
Morton	27,471	31,621	33,389	34,657	35,569	36,254	4,633
Mountrail	7,673	11,210	12,928	14,232	15,242	16,103	4,893
Nelson	3,126	2,861	2,658	2,525	2,422	2,330	-531
Oliver	1,846	1,902	1,916	1,943	1,937	1,931	29
Pembina	7,413	6,974	6,601	6,319	6,071	5,829	-1,145
Pierce	4,357	4,243	4,117	4,073	4,055	4,040	-203
Ramsey	11,451	11,838	11,789	11,768	11,746	11,695	-143

County	2010	2020	2025	2030	2035	2040	Change 2020-2040
Ransom	5,457	5,438	5,327	5,269	5,221	5,180	-258
Renville	2,470	2,595	2,607	2,631	2,655	2,674	79
Richland	16,321	16,540	16,500	16,436	16,352	16,241	-299
Rolette	13,937	15,629	16,359	17,177	17,944	18,641	3,012
Sargent	3,829	3,899	3,878	3,841	3,792	3,740	-159
Sheridan	1,321	1,292	1,255	1,204	1,153	1,114	-178
Sioux	4,153	4,748	5,108	5,505	5,879	6,231	1,483
Slope	727	796	811	812	810	801	5
Stark	24,199	34,170	38,405	41,429	43,803	45,825	11,655
Steele	1,975	1,942	1,890	1,867	1,856	1,843	-99
Stutsman	21,100	21,224	20,981	20,744	20,505	20,197	-1,027
Towner	2,246	2,258	2,228	2,230	2,231	2,236	-22
Traill	8,121	8,029	7,906	7,838	7,780	7,714	-315
Walsh	11,119	10,975	10,740	10,618	10,540	10,470	-505
Ward	61,675	76,184	82,519	87,144	91,000	94,378	18,194
Wells	4,207	4,028	3,857	3,757	3,691	3,641	-387
Williams	22,398	39,380	47,533	53,858	58,975	63,505	24,125

Source: US Census Bureau, 2020

D.4 Current Population by County

County	Total Population
Adams County	2,237
Barnes County	10,869
Benson County	6,090
Billings County	839
Bottineau County	6,442
Bowman County	3,024
Burke County	2,177
Burleigh County	97,895
Cass County	182,992
Cavalier County	3,725
Dickey County	5,013
Divide County	2,196
Dunn County	4,054
Eddy County	2,378
Emmons County	3,316
Foster County	3,396
Golden Valley County	1,812
Grand Forks County	73,101
Grant County	2,351
Griggs County	2,242
Hettinger County	2,502
Kidder County	2,397
LaMoure County	4,173
Logan County	1,814
McHenry County	5,420
McIntosh County	2,568
McKenzie County	13,762
McLean County	9,788
Mercer County	8,405
Morton County	32,916
Mountrail County	9,717
Nelson County	3,035
Oliver County	1,850
Pembina County	6,912
Pierce County	4,038
Ramsey County	11,638
Ransom County	5,679
Renville County	2,328
Richland County	16,546
Rolette County	12,508

County	Total Population
Sargent County	3,839
Sheridan County	1,328
Sioux County	3,993
Slope County	775
Stark County	32,710
Steele County	1,870
Stutsman County	21,678
Towner County	2,190
Traill County	8,008
Walsh County	10,631
Ward County	69,686
Wells County	4,031
Williams County	38,460
Total	**773,344**

Source: American Community Survey, 2021

D.5 Building Value By County

COUNTY	BUILDING VALUE
Adams	$ 612,779,706
Barnes	$ 3,190,512,275
Benson	$ 1,362,172,932
Billings	$ 683,009,665
Bottineau	$ 6,521,796,977
Bowman	$ 1,270,043,702
Burke	$ 1,020,943,806
Burleigh	$ 17,604,065,475
Cass	$ 40,439,923,739
Cavalier	$ 1,975,382,680
Dickey	$ 1,862,747,725
Divide	$ 3,673,673,790
Dunn	$ 2,063,418,312
Eddy	$ 1,076,942,125
Emmons	$ 4,891,300,845
Foster	$ 1,085,928,024
Golden Valley	$ 759,441,830
Grand Forks	$ 15,976,890,088
Grant	$ 1,161,847,905
Griggs	$ 710,338,670
Hettinger	$ 3,470,700,064
Kidder	$ 939,873,394
LaMoure	$ 1,336,272,214
Logan	$ 914,480,623
McHenry	$ 6,546,783,463
McIntosh	$ 1,406,494,393
McKenzie	$ 4,879,579,357
McLean	$ 9,016,637,478
Mercer	$ 3,201,622,481
Morton	$ 8,505,133,566
Mountrail	$ 3,754,260,380
Nelson	$ 1,095,891,383
Oliver	$ 599,420,257
Pembina	$ 2,587,826,104
Pierce	$ 1,600,333,128
Ramsey	$ 4,831,464,819
Ransom	$ 1,422,621,949
Renville	$ 1,176,641,529
Richland	$ 5,591,008,975
Rolette	$ 6,365,062,338

COUNTY	BUILDING VALUE	
Sargent	$	1,196,985,161
Sheridan	$	3,411,726,523
Sioux	$	783,299,759
Slope	$	218,957,775
Stark	$	6,611,217,119
Steele	$	912,781,829
Stutsman	$	6,316,212,160
Towner	$	726,990,929
Traill	$	3,926,826,620
Walsh	$	7,624,612,502
Ward	$	18,498,801,095
Wells	$	1,275,290,092
Williams	$	16,911,067,216

Source: National Risk Index, 2023

Historic Buildings

Property Name	County	City	Street & Number	Listed Date	Area of Significance
Adams County Courthouse	Adams	Hettinger	600 Adams Ave.	11/14/1985	POLITICS/GOVERNMENT; ARCHITECTURE
US Post Office-Hettinger	Adams	Hettinger	Lake St. and Adams Ave.	11/1/1989	POLITICS/GOVERNMENT; ARCHITECTURE
Ladbury Church	Barnes	Dazey	6 mi. E of Dazey on ND 26, N 3 mi. then 0.25 mi. W	10/4/2005	EXPLORATION/SETTLEMENT; RELIGION; ARCHITECTURE
Alderman School District No. 78	Barnes	Valley City	Cty. Rd. 21	6/25/2013	EDUCATION; ARCHITECTURE
All Saints' Episcopal Church	Barnes	Valley City	516 N. Central Ave.	12/3/1992	EXPLORATION/SETTLEMENT; ARCHITECTURE
Barnes County Courthouse	Barnes	Valley City	491 Second Ave. NW	11/14/1985	POLITICS/GOVERNMENT; ARCHITECTURE
Green Consolidated School	Barnes	Valley City	39 R St. SE.	11/1/2011	EDUCATION; ENTERTAINMENT/RECREATION; ARCHITECTURE
Rudolf Hotel	Barnes	Valley City	Central Ave. and 2nd St.	2/10/1983	COMMERCE; ARCHITECTURE
US Post Office-Valley City	Barnes	Valley City	149 NE. Third St.	11/1/1989	COMMUNITY PLANNING AND DEVELOPMENT; ECONOMICS; POLITICS/GOVERNMENT; ARCHITECTURE
Valley City Carnegie Library	Barnes	Valley City	413 Central Ave.	10/18/1979	ARCHITECTURE; SOCIAL HISTORY
Valley City Municipal Auditorium	Barnes	Valley City	320 Central Ave. S.	1/4/2008	ENTERTAINMENT/RECREATION; SOCIAL HISTORY; ARCHITECTURE
Midland Continental Railroad Depot	Barnes	Wimbledon	401 Railway St.	9/3/2003	TRANSPORTATION
Fort Totten	Benson	Fort Totten	S of Fort Totten off ND 57	12/9/1971	MILITARY
Viking Lutheran Church	Benson	Maddock	SE of Maddock	11/14/1979	EXPLORATION/SETTLEMENT; ARCHITECTURE; RELIGION; SOCIAL HISTORY
Benson County Courthouse	Benson	Minnewaukan	B Ave.	11/2/1978	POLITICS/GOVERNMENT; ARCHITECTURE
Grace Episcopal Church	Benson	Minnewaukan	210 C Ave. S.	9/9/1994	ARCHITECTURE
Pierson Farm	Benson	York	3.5 mi. S of York off US 2	8/29/1985	ARCHITECTURE

Property Name	County	City	Street & Number	Listed Date	Area of Significance
Billings County Courthouse	Billings	Medora	4th St. and 4th Ave.	12/16/1977	EXPLORATION/SETTLEMENT; POLITICS/GOVERNMENT; ARCHITECTURE
Chateau de Mores	Billings	Medora	SW of Medora on W bank of Little Missouri River	4/16/1975	COMMERCE; AGRICULTURE; SOCIAL HISTORY
Peaceful Valley Ranch	Billings	Medora	N of Medora near Little Missouri R., Theodore Roosevelt National Park	7/13/1994	AGRICULTURE; ENTERTAINMENT/RECREATION; CONSERVATION; ARCHITECTURE
St. Mary's Catholic Church	Billings	Medora	4th St. and 3rd Ave.	12/2/1977	EXPLORATION/SETTLEMENT; ARCHITECTURE; RELIGION
Von Hoffman House	Billings	Medora	Broadway and 5th St.	11/21/1977	EXPLORATION/SETTLEMENT; ARCHITECTURE
State Bank of Antler	Bottineau	Antler	Antler Sq.	4/15/2019	ARCHITECTURE; COMMUNITY PLANNING AND DEVELOPMENT
Main, North Dakota School of Forestry, Old	Bottineau	Bottineau	Alexander St. (N of terminus with 2nd St.)	9/1/2006	ARCHITECTURE; CONSERVATION; EDUCATION; POLITICS/GOVERNMENT
Swedish Zion Lutheran Church	Bottineau	Souris	32 rods from NE. corner of SE. corner T164N, R77W, sec34.	4/1/2013	ARCHITECTURE; EXPLORATION/SETTLEMENT; EUROPEAN
Schade, Emma Petznick and Otto, House	Bowman	Bowman	406 W. Divide	4/16/2008	ARCHITECTURE
Burke County Courthouse	Burke	Bowbells	Main St.	11/14/1985	POLITICS/GOVERNMENT; ARCHITECTURE
Burke County World War Memorial Hall	Burke	Flaxton	101 1st St.	1/4/2018	ARCHITECTURE; ENTERTAINMENT/RECREATION; POLITICS/GOVERNMENT; SOCIAL HISTORY
Metzger, William E., House	Burke	Portal	112 Makee St.	8/22/2007	EXPLORATION/SETTLEMENT; SOCIAL HISTORY; POLITICS/GOVERNMENT; COMMERCE; AGRICULTURE; ARCHITECTURE
Portal State Bank	Burke	Portal	19 Main St.	10/3/1996	ARCHITECTURE
Bismarck Civic Auditorium	Burleigh	Bismarck	201 N. 6th St.	6/7/1976	ARCHITECTURE; PERFORMING ARTS

Property Name	County	City	Street & Number	Listed Date	Area of Significance
Bismarck Tribune Building	Burleigh	Bismarck	22 N. 4th St.	10/22/1982	ARCHITECTURE; COMMUNICATIONS
Brandt, Dr. Albert M. and Evelyn M., House	Burleigh	Bismarck	323 E. Ave. B	8/16/2000	ARCHITECTURE
Burleigh County Courthouse	Burleigh	Bismarck	E. Thayer Ave.	11/14/1985	POLITICS/GOVERNMENT; ARCHITECTURE
Depression Era Work Relief Construction Features at Double Ditch Indian Village Site State Historic Site	Burleigh	Bismarck	ND 1804	11/5/2014	ARCHITECTURE; LANDSCAPE ARCHITECTURE; CONSERVATION
Depression Era Work Relief Construction Features at Menoken State Historic Site	Burleigh	Bismarck	171st St and 32nd Ave NE; 1.7 mi N of Menoken	12/7/2010	ARCHITECTURE; LANDSCAPE ARCHITECTURE; CONSERVATION
Former North Dakota Executive Mansion	Burleigh	Bismarck	320 Ave. B, E.	4/16/1975	POLITICS/GOVERNMENT
Grady, Fred and Gladys, House	Burleigh	Bismarck	414 East Avenue F	7/21/2006	POLITICS/GOVERNMENT
Lundquist, Oliver and Gertrude, House	Burleigh	Bismarck	622 W. Thayer St.	7/21/2006	POLITICS/GOVERNMENT
Northern Pacific Railway Depot	Burleigh	Bismarck	410 E. Main Ave.	9/19/1977	TRANSPORTATION; ARCHITECTURE
Our Lady of the Annunciation Chapel at Annunciation Priory	Burleigh	Bismarck	7500 University Dr.	6/16/2020	ARCHITECTURE
Patterson Hotel	Burleigh	Bismarck	422 E. Main Ave.	12/8/1976	COMMERCE; ENGINEERING; POLITICS/GOVERNMENT; ARCHITECTURE
Patterson, E. G., Building	Burleigh	Bismarck	412-414 Main St.	10/22/1982	ENTERTAINMENT/RECREATION; POLITICS/GOVERNMENT; ARCHITECTURE
Soo Hotel	Burleigh	Bismarck	112-114 5th St., N.	5/9/1983	ARCHITECTURE
St. George's Episcopal Memorial Church	Burleigh	Bismarck	601 North 4th St.	10/5/2021	ARCHITECTURE

Property Name	County	City	Street & Number	Listed Date	Area of Significance
Towne-Williams House	Burleigh	Bismarck	722 7th St., N.	4/14/1975	POLITICS/GOVERNMENT; ARCHITECTURE; SOCIAL HISTORY
U.S. Post Office and Courthouse	Burleigh	Bismarck	304 E. Broadway	6/23/1976	ARCHITECTURE
Van Horn Hotel	Burleigh	Bismarck	114 N. 3rd St.	5/10/1984	COMMERCE
Webb Brothers Block	Burleigh	Bismarck	317 E. Main Ave.	10/13/1983	COMMERCE; POLITICS/GOVERNMENT; ARCHITECTURE
Florence Lake School No. 3	Burleigh	Wing	10 mi. N. of Wing off ND 14	11/1/2011	ARCHITECTURE; EDUCATION; SOCIAL HISTORY
1916 Buffalo High School	Cass	Buffalo	303 Pearl St. N	5/10/2001	ARCHITECTURE
Old Stone Church	Cass	Buffalo	206 N Wilcox Ave.	3/29/1996	ARCHITECTURE
St. Stephen's Episcopal Church	Cass	Casselton	Jct. of 3rd Ave. and 5th St., SE corner	12/3/1992	EXPLORATION/SETTLEMENT; ARCHITECTURE
Lindemann, Robert, House	Cass	Enderlin	1.5 mi. E and 2.75 mi. N of Enderlin	9/2/1994	ARCHITECTURE
Anderson, George and Beth, House	Cass	Fargo	1458 S. River Rd.	6/19/2017	ARCHITECTURE
Barrington Apartments	Cass	Fargo	219 Twelfth St., S	7/27/1989	ARCHITECTURE
Black Building	Cass	Fargo	114 Broadway N.	12/6/2016	ARCHITECTURE; COMMERCE; COMMUNICATIONS
Cass County Courthouse	Cass	Fargo	211 S. 9th St.	12/22/1983	POLITICS/GOVERNMENT; ARCHITECTURE
DeLendrecie's Department Store	Cass	Fargo	620--624 Main St.	10/22/1979	COMMERCE; ARCHITECTURE
Dibley House	Cass	Fargo	331 8th Ave., S	11/25/1980	ARCHITECTURE
Fargo City Detention Hospital	Cass	Fargo	57 Eleventh Ave. N	4/7/1987	ARCHITECTURE
Fargo Theatre Building	Cass	Fargo	314 Broadway	10/21/1982	ENTERTAINMENT/RECREATION; ARCHITECTURE
Federal Building and U.S. Post Office	Cass	Fargo	657 2nd Ave. North	6/4/2021	ARCHITECTURE
Grand Lodge of North Dakota, Ancient Order of United Workmen	Cass	Fargo	112-114 N. Roberts St.	8/24/1979	COMMERCE; EDUCATION; ARCHITECTURE
Great Northern Freight Warehouse	Cass	Fargo	420 N. Seventh St.	11/21/1990	COMMERCE; TRANSPORTATION; ARCHITECTURE
Holes, James, House	Cass	Fargo	1230 Fifth St. N	4/7/1987	AGRICULTURE; ARCHITECTURE

Property Name	County	City	Street & Number	Listed Date	Area of Significance
Knerr Block, Floyd Block, McHench Building and Webster and Cole Building	Cass	Fargo	13, 15, 17-19, and 21-23 8th St., S.	5/12/1983	ARCHITECTURE
Lewis House	Cass	Fargo	1002 3rd Ave., S.	10/18/1979	COMMERCE; POLITICS/GOVERNMENT; ARCHITECTURE
Masonic Block	Cass	Fargo	11 S. 8th St.	8/3/1979	EDUCATION; ARCHITECTURE
Northern Pacific Railway Depot	Cass	Fargo	701 Main Ave.	2/13/1975	TRANSPORTATION; ARCHITECTURE
Pence Automobile Company Warehouse	Cass	Fargo	301 N. P Ave.	1/7/1994	ARCHITECTURE
Powers Hotel	Cass	Fargo	400 Broadway	5/12/1983	ARCHITECTURE
Union Storage & Transfer Cold Storage Warehouse and Armour Creamery Building	Cass	Fargo	1026-1032 Northern Pacific Ave. and 1034-1102 Northern Pacific Ave.	2/9/2007	ARCHITECTURE; COMMERCE; INDUSTRY; TRANSPORTATION
Wilson, Woodrow, School	Cass	Fargo	315 N. University Dr.	10/24/2012	ARCHITECTURE; EDUCATION
Watts Free Library	Cass	Leonard	101 3rd St. N.	5/31/1990	EDUCATION; ARCHITECTURE; SOCIAL HISTORY
Roxy Theatre	Cavalier	Langdon	714 Third St.	11/18/1998	ARCHITECTURE; SOCIAL HISTORY
US Post Office-Langdon	Cavalier	Langdon	323 Eighth Ave.	11/1/1989	COMMUNITY PLANNING AND DEVELOPMENT; ART; ECONOMICS; POLITICS/GOVERNMENT; ARCHITECTURE
Dickey County Courthouse	Dickey	Ellendale	Off U.S. 281	11/25/1980	POLITICS/GOVERNMENT; ARCHITECTURE
Ellendale Opera House Block	Dickey	Ellendale	105--111 Main St.	4/22/1992	ENTERTAINMENT/RECREATION; ARCHITECTURE
Carroll House Hotel	Dickey	Fullerton	19 N. Monroe St.	3/17/1994	COMMERCE; ARCHITECTURE
Klein and Sutmar Block	Dickey	Oakes	419 Main Ave.	10/16/1987	ARCHITECTURE
Noonan, Walter T., House	Dickey	Oakes	215 S. Seventh St.	10/16/1987	ARCHITECTURE
Oakes National Bank Block	Dickey	Oakes	501 Main Ave.	10/16/1987	ARCHITECTURE

Property Name	County	City	Street & Number	Listed Date	Area of Significance
US Post Office-Oakes	Dickey	Oakes	611 Main Ave.	11/1/1989	ECONOMICS; POLITICS/GOVERNMENT; ARCHITECTURE
U.S. Inspection Station-Ambrose, North Dakota	Divide	Ambrose	ND 42	9/10/2014	ARCHITECTURE; POLITICS/GOVERNMENT
Divide County Courthouse	Divide	Crosby	In Crosby	11/25/1980	POLITICS/GOVERNMENT; ARCHITECTURE
Alkabo School	Divide	Divide	North end of Main St	12/7/2010	ARCHITECTURE; EDUCATION; SOCIAL HISTORY
Nielsen, Niels, Fourteen-Side Barn Farm	Divide	Noonan	ND 38	10/7/1986	ARCHITECTURE
Travelers Hotel	Divide	Noonan	121 Main St	7/6/2010	COMMERCE; SOCIAL HISTORY
Independence Congregational Church	Dunn	Mandaree	BIA Rd. 13	7/14/2015	NATIVE AMERICAN; LITERATURE; SOCIAL HISTORY; ARCHITECTURE
Saints Peter and Paul Church	Dunn	New Hradec	N/A	2/3/1986	EXPLORATION/SETTLEMENT; RELIGION
Eddy County Courthouse	Eddy	New Rockford	524 Central Ave.	11/14/1985	POLITICS/GOVERNMENT; ARCHITECTURE
Marriage, Sylvanus, Octagonal Barn	Eddy	New Rockford	ND 38	10/7/1986	ARCHITECTURE
US Post Office-New Rockford	Eddy	New Rockford	821 N. First Ave.	11/1/1989	COMMUNITY PLANNING AND DEVELOPMENT; ART; ECONOMICS; POLITICS/GOVERNMENT; ARCHITECTURE
Emmons County Courthouse	Emmons	Linton	Fifth St.	11/14/1985	POLITICS/GOVERNMENT; ARCHITECTURE
Willows Hotel	Emmons	Linton	112 S. Broadway	5/2/1996	ARCHITECTURE; COMMERCE
Saints Peter and Paul Catholic Church Complex	Emmons	Strasburg	First Ave.	9/25/1986	ARCHITECTURE
Welk, Ludwig and Christina, Homestead	Emmons	Strasburg	2.5 NW of Strasburg	10/28/1993	EUROPEAN; ARCHITECTURE
Foster County Courthouse	Foster	Carrington	In Carrington	11/25/1980	POLITICS/GOVERNMENT; ARCHITECTURE
Putnam, Thomas Nichols, House	Foster	Carrington	533 Main St.	11/24/1992	ARCHITECTURE

Property Name	County	City	Street & Number	Listed Date	Area of Significance
US Post Office-Carrington	Foster	Carrington	87 N. Ninth Ave.	11/1/1989	COMMUNITY PLANNING AND DEVELOPMENT; ECONOMICS; POLITICS/GOVERNMENT; ARCHITECTURE
Golden Valley County Courthouse	Golden Valley	Beach	First Ave. SE	11/14/1985	POLITICS/GOVERNMENT; ARCHITECTURE
Sentinel Butte Public School	Golden Valley	Sentinel Butte	Byron St.	10/21/1982	EDUCATION; ARCHITECTURE
Administration Building for the City of Grand Forks at the Grand Forks Airport	Grand Forks	Grand Forks	802 North 43rd St.	12/3/2020	ARCHITECTURE; TRANSPORTATION; POLITICS/GOVERNMENT; MILITARY
Beare, Harriet and Thomas, House	Grand Forks	Grand Forks	420 Reeves Dr.	4/20/1995	ARCHITECTURE
Ben Franklin Elementary School	Grand Forks	Grand Forks	1016 South 20th St.	7/17/2020	SOCIAL HISTORY; ARCHITECTURE; EDUCATION
B'nai Israel Synagogue and Montefiore Cemetery	Grand Forks	Grand Forks	601 Cottonwood St. & 1450 N. Columbia Rd.	10/13/2011	OTHER-ETHNIC; RELIGION; SOCIAL HISTORY; ARCHITECTURE
Building at 201 S. 3rd St.	Grand Forks	Grand Forks	201 S. 3rd St.	10/26/1982	ARCHITECTURE
Building at 312 Kittson Ave.	Grand Forks	Grand Forks	312 Kittson Ave.	10/26/1982	ARCHITECTURE
Campbell, Thomas D., House	Grand Forks	Grand Forks	2405 Belmont Rd.	9/29/1987	ARCHITECTURE
Clifford, George B., House	Grand Forks	Grand Forks	406 Reeves Dr.	9/30/1986	COMMERCE; ARCHITECTURE
Dakota Block	Grand Forks	Grand Forks	21 S. 4th St.	10/26/1982	ARCHITECTURE
DeRemer, Joseph Bell, House	Grand Forks	Grand Forks	625 Belmont Rd.	6/9/1983	ARCHITECTURE
Dinnie Apartments	Grand Forks	Grand Forks	102--108 Fourth Ave. S	6/3/1994	ARCHITECTURE
Edgar Building	Grand Forks	Grand Forks	314 Kittson Ave.	4/15/1983	ARCHITECTURE
Finks and Gokey Block	Grand Forks	Grand Forks	414-420 DeMers Ave.	4/20/1983	COMMERCE; ARCHITECTURE
First National Bank	Grand Forks	Grand Forks	322 DeMers Ave.	10/26/1982	ARCHITECTURE
Grand Forks City Hall	Grand Forks	Grand Forks	404 N. 2nd Ave.	10/26/1982	ARCHITECTURE

Property Name	County	City	Street & Number	Listed Date	Area of Significance
Grand Forks County Courthouse	Grand Forks	Grand Forks	S. 5th St	11/25/1980	POLITICS/GOVERNMENT; ARCHITECTURE
Grand Forks County Fairgrounds WPA Structures	Grand Forks	Grand Forks	2300 Gateway Dr.	4/21/2009	ARCHITECTURE; SOCIAL HISTORY; ENTERTAINMENT/RECREATION; POLITICS/GOVERNMENT
Grand Forks Herald	Grand Forks	Grand Forks	120-124 N. 4th St.	11/30/1982	ARCHITECTURE
Grand Forks Mercantile Building 1898	Grand Forks	Grand Forks	112-118 N. Third St.	7/14/2004	COMMERCE; ARCHITECTURE
Grand Forks Mercantile Co.	Grand Forks	Grand Forks	124 N. 3rd St.	10/26/1982	COMMERCE
Grand Forks Near Southside Historic District (Boundary Increase)	Grand Forks	Grand Forks	1216 Belmont Rd.	6/26/2006	EXPLORATION/SETTLEMENT; ARCHITECTURE
Grand Forks Woolen Mills	Grand Forks	Grand Forks	301 N. 3rd St.	10/26/1983	INDUSTRY; COMMERCE; ARCHITECTURE
Great Northern Freight Warehouse and Depot	Grand Forks	Grand Forks	899 Second Ave. N.	1/29/1990	COMMERCE; TRANSPORTATION; ARCHITECTURE
Hariman Sanatorium	Grand Forks	Grand Forks	2002 University Ave.	8/28/2013	HEALTH/MEDICINE
Hook and Ladder No. 1 and Hose Co. No. 2	Grand Forks	Grand Forks	215 S. 4th St.	10/26/1982	COMMUNITY PLANNING AND DEVELOPMENT
House at 1648 Riverside Drive	Grand Forks	Grand Forks	1648 Riverside Dr.	9/2/1994	ARCHITECTURE
Iddings Block	Grand Forks	Grand Forks	9 N. 3rd St.	10/26/1982	COMMERCE; ARCHITECTURE
Kegs Drive-In, The	Grand Forks	Grand Forks	901 N. 5th St.	8/24/2011	ARCHITECTURE; COMMERCE
Kelly, J. Nelson, House	Grand Forks	Grand Forks	521 S. 5th St.	2/18/1994	ARCHITECTURE
Lewis and Clark Elementary School	Grand Forks	Grand Forks	1100 13th Ave. South	7/17/2020	SOCIAL HISTORY; ARCHITECTURE; EDUCATION
Lyons Garage	Grand Forks	Grand Forks	214-218 N. 4th St.	10/26/1982	COMMERCE; ARCHITECTURE
Masonic Temple	Grand Forks	Grand Forks	413-421 Bruce Ave.	10/26/1982	ARCHITECTURE
Metropolitan Opera House	Grand Forks	Grand Forks	116 S. Third St.	8/27/1999	ENTERTAINMENT/RECREATION

Property Name	County	City	Street & Number	Listed Date	Area of Significance
North Dakota Mill and Elevator	Grand Forks	Grand Forks	1823 Mill Rd.	5/11/1992	COMMERCE; POLITICS/GOVERNMENT; AGRICULTURE
Northern Pacific Depot and Freight House	Grand Forks	Grand Forks	202 N. 3rd St.	10/26/1982	COMMERCE; ARCHITECTURE
Odd Fellows Block	Grand Forks	Grand Forks	23-25 S. 4th St.	10/26/1982	ARCHITECTURE; SOCIAL HISTORY
Oxford House	Grand Forks	Grand Forks	University of North Dakota campus	5/2/1973	EDUCATION; ARCHITECTURE; SOCIAL HISTORY
Roller Office Supply	Grand Forks	Grand Forks	7 N. 3rd St.	10/26/1982	ARCHITECTURE
Skarsbo Apartments	Grand Forks	Grand Forks	204 & 210 N. 6th St.	8/27/2013	COMMUNITY PLANNING AND DEVELOPMENT
South Junior High School	Grand Forks	Grand Forks	1224 Walnut St.	3/5/1999	EDUCATION; ARCHITECTURE
Speed Printing	Grand Forks	Grand Forks	220 S. 3rd St.	10/26/1982	ARCHITECTURE
St. John's Block Commercial Exchange	Grand Forks	Grand Forks	2 N. 3rd St.	10/26/1982	ARCHITECTURE
St. Michael's Church	Grand Forks	Grand Forks	520 N. Sixth St.	6/30/1988	ARCHITECTURE
St. Michael's Hospital and Nurses' Residence	Grand Forks	Grand Forks	813 Lewis Blvd.	4/20/1995	ARCHITECTURE; HEALTH/MEDICINE
St. Michael's Parochial School	Grand Forks	Grand Forks	504 5th Ave., N.	7/18/2016	ARCHITECTURE; EDUCATION; RELIGION
Stratford Building	Grand Forks	Grand Forks	311 DeMers Ave.	10/26/1982	ARCHITECTURE
Telephone Co. Building	Grand Forks	Grand Forks	24 N. 4th St.	10/26/1982	ARCHITECTURE
U.S. Post Office and Courthouse	Grand Forks	Grand Forks	102 N. 4th St.	6/3/1976	ARCHITECTURE
United Lutheran Church	Grand Forks	Grand Forks	324 Chestnut St.	12/30/1991	ARCHITECTURE
Valley Junior High School	Grand Forks	Grand Forks	2100 5th Ave. North	7/17/2020	SOCIAL HISTORY; ARCHITECTURE; EDUCATION
Viking Elementary School	Grand Forks	Grand Forks	809 22nd Ave. South	7/17/2020	SOCIAL HISTORY; ARCHITECTURE; EDUCATION
Washington School	Grand Forks	Grand Forks	422 N. Sixth St.	2/24/1992	ARCHITECTURE
Wells-Denbrook Architects Office Building	Grand Forks	Grand Forks	1701 Cherry St.	11/4/2014	ARCHITECTURE; COMMERCE

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West Elementary School	Grand Forks	Grand Forks	615 North 25th St.	7/17/2020	SOCIAL HISTORY; ARCHITECTURE; EDUCATION
Wheeler, Dr. Henry, House	Grand Forks	Grand Forks	420 Franklin St.	1/16/1986	HEALTH/MEDICINE; ARCHITECTURE
Wilder Elementary School	Grand Forks	Grand Forks	1009 North 3rd St.	7/17/2020	SOCIAL HISTORY; ARCHITECTURE; EDUCATION
Wright Block	Grand Forks	Grand Forks	408-412 DeMers Ave.	10/26/1982	ARCHITECTURE
Funseth, Carlott, Round Barn	Grand Forks	Kempton	ND 38	10/7/1986	ARCHITECTURE
Avalon Theater	Grand Forks	Larimore	210 Towner Ave.	2/4/1991	ENTERTAINMENT/RECREATION; ARCHITECTURE
Larimore City Hall	Grand Forks	Larimore	Block 64, bounded by Towner, 3rd, Terry and Main	5/31/1990	POLITICS/GOVERNMENT; ARCHITECTURE; SOCIAL HISTORY
Linwell, Martin V., House	Grand Forks	Northwood	316 S. Raymond St.	2/28/1980	ARCHITECTURE
Carson Roller Mill	Grant	Carson	S side of Carson	4/30/1980	INDUSTRY
Hope Lutheran Church	Grant	Elgin	W of ND 49 S of Lake Tschida	1/16/1992	EUROPEAN; EXPLORATION/SETTLEMENT; ARCHITECTURE
Evangelisch Lutheraner Dreieinigkeit Gemeinde	Grant	New Leipzig	63rd St., SW section 15 Township 135 Range 90	9/9/2009	EXPLORATION/SETTLEMENT; OTHER-ETHNIC
Griggs County Courthouse	Griggs	Cooperstown	Rollin Ave.	7/21/1977	POLITICS/GOVERNMENT; ARCHITECTURE
Northern Lights Masonic Lodge	Griggs	Cooperstown	Ninth St.	10/16/1987	ARCHITECTURE
Oscar-Zero Missile Alert Facility	Griggs	Cooperstown	St. Hwy. 45	10/14/2008	MILITARY; ENGINEERING
Hettinger County Courthouse	Hettinger	Mott	336 Pacific St.	11/14/1985	POLITICS/GOVERNMENT; ARCHITECTURE
Neuburg Congregational Church	Hettinger	Mott	83rd Ave. SW and 57 St. SW	8/15/2007	EXPLORATION/SETTLEMENT
Stern, John and Fredricka (Roth), Homestead	Hettinger	Mott	2 mi. E of Mott on ND 21	9/19/2008	EXPLORATION/SETTLEMENT; EUROPEAN; ARCHITECTURE
Riverside	Hettinger	New England	418 Main St.	5/12/1983	COMMERCE; EXPLORATION/SETTLEMENT
Hill, Dr. S. W., Drug Store	Hettinger	Regent	Off ND 21	11/10/1980	HEALTH/MEDICINE; ARCHITECTURE

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Robinson Hall	Kidder	Robinson	118 Main St.	3/26/2018	ARCHITECTURE; SOCIAL HISTORY
First Presbyterian Church of Steele	Kidder	Steele	Mitchell Ave. N and First St.	5/19/2004	ARCHITECTURE; SOCIAL HISTORY
Kidder County Courthouse	Kidder	Steele	Broadway Ave.	11/14/1985	POLITICS/GOVERNMENT
Dagen's Grocery	La Moure	Jud	616 Central Ave.	7/6/2005	COMMERCE; EXPLORATION/SETTLEMENT
La Moure County Courthouse	La Moure	La Moure	In La Moure	11/25/1980	POLITICS/GOVERNMENT; ARCHITECTURE
Abell, Robert, Round Barn	Logan	Burnstad	ND 38	10/7/1986	ARCHITECTURE
Logan County Courthouse	Logan	Napoleon	301 Broadway	11/14/1985	POLITICS/GOVERNMENT; ARCHITECTURE
Norway Lutheran Church and Cemetery	McHenry	Denbigh	10 mi. S of Denbigh, S of the Souris R.	10/14/1994	ARCHITECTURE
Granville State Bank	McHenry	Granville	Main and 2nd Sts.	9/13/1977	ECONOMICS; EXPLORATION/SETTLEMENT; ARCHITECTURE
Liberty Baptist Church	McHenry	Kief	Fifth & Christina Sts.	10/16/1987	RELIGION
McHenry County Courthouse	McHenry	Towner	In Towner	11/25/1980	POLITICS/GOVERNMENT; ARCHITECTURE
Hotel Berry	McHenry	Velva	100 W. Central Ave.	10/20/1982	COMMERCE; ARCHITECTURE
Sevareid, Alfred and Clara, House	McHenry	Velva	405 2nd St., W	10/3/1996	ARCHITECTURE
McIntosh County Courthouse	McIntosh	Ashley	In Ashley	11/25/1980	POLITICS/GOVERNMENT; ARCHITECTURE
Zeeland Hall	McIntosh	Zeeland	211 S. Main Ave.	6/14/2016	ENTERTAINMENT/RECREATION; ARCHITECTURE
Grassy Butte Post Office	McKenzie	Grassy Butte	Off U.S. 85	11/26/1980	EXPLORATION/SETTLEMENT; ARCHITECTURE; COMMUNICATIONS
Sandstone School	McKenzie	Keene	29th St. NW	4/11/2008	EXPLORATION/SETTLEMENT; EDUCATION
Semevolos Farm	McLean	Butte	SE of Butte	10/16/1987	ARCHITECTURE
Schlafmann Barn	McLean	Turtle Lake	696 l6th Ave. NW	12/13/2022	AGRICULTURE; ARCHITECTURE
Freborg Homestead	McLean	Underwood	3231 2nd St., NW.	9/10/2014	EXPLORATION/SETTLEMENT
Ingersoll School	McLean	Washburn	11 mi N on Alt 200, R. 2 mi on Hwy 200, turn R for .4 mi on gravel	3/31/2010	EDUCATION; SOCIAL HISTORY

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Holy Trinity Ukrainian Greek Orthodox Church	McLean	Wilton	Bismarck Ave. and 6th St.	10/22/1982	ARCHITECTURE; RELIGION
Soo Line Depot	McLean	Wilton	1st St. and McLean Ave.	3/29/1978	TRANSPORTATION; ARCHITECTURE
Beulah School	Mercer	Beulah	205 2nd St., NW	9/30/1997	LANDSCAPE ARCHITECTURE; EDUCATION; ARCHITECTURE
Krause, Fred, House	Mercer	Hazen	321 W. Main St.	4/14/1992	ARCHITECTURE
St. Paul's Lutheran Church	Mercer	Hazen	4474 1st NW	6/25/2005	SOCIAL HISTORY
Hotel Brown	Morton	Flasher	202 Main St. N.	6/23/2014	COMMERCE; SOCIAL HISTORY
German Evangelical St. Johns Church-Deutsche Evangelische St. Johannes Kirche	Morton	Hebron	624 Church Ave.	1/11/2001	ARCHITECTURE; EUROPEAN
Rehm, Louis, Barn	Morton	Hebron	2.5 mi. N of Hebron	1/31/1994	ARCHITECTURE
Dunlap, Stuart, House	Morton	Mandan	201 7th Ave.	6/8/1992	COMMERCE; ARCHITECTURE
Lewis and Clark Hotel	Morton	Mandan	404 W. Main St.	5/9/1983	COMMERCE; POLITICS/GOVERNMENT; ARCHITECTURE
Mandan High School	Morton	Mandan	406 4th St.	7/24/2017	EDUCATION; ARCHITECTURE
Sunnyside Farm Barn	Morton	Mandan	Approximately 1.7 mi. W of Mandan, 0.5 mi. S of W. Main St. on S side of Dead Heart Slough	1/19/1996	POLITICS/GOVERNMENT; AGRICULTURE
Welsh House	Morton	Mandan	208 5th Ave., NW	4/22/1980	ARCHITECTURE
Wabek Consolidated School	Mountrail	Plaza	3825 64th Ave. NW	10/22/2019	ARCHITECTURE; EDUCATION
Mountrail County Courthouse	Mountrail	Stanley	N. Main St.	12/22/1978	POLITICS/GOVERNMENT; ARCHITECTURE
Episcopal Church of the Good Shepard-Lakota	Nelson	Lakota	216 D Ave. W.	10/10/2017	ARCHITECTURE; RELIGION; SOCIAL HISTORY
Tofthagen Library Museum	Nelson	Lakota	116 W. B Ave.	9/26/1991	EDUCATION; ARCHITECTURE

Property Name	County	City	Street & Number	Listed Date	Area of Significance
Old Settler's Pavilion	Nelson	Pekin	63 Pavilion Rd	6/12/2010	ARCHITECTURE; SOCIAL HISTORY; ENTERTAINMENT/RECREATION
Gunlogson Farmstead Historic Site	Pembina	Cavalier	13571 ND 5	9/18/2008	SOCIAL HISTORY; CONSERVATION; AGRICULTURE
Pembina County Courthouse	Pembina	Cavalier	Off ND 5	11/25/1980	POLITICS/GOVERNMENT; ARCHITECTURE
Drayton United Methodist Church	Pembina	Drayton	ND 44	12/10/1979	ARCHITECTURE
Vikur Lutheran Church at Mountain	Pembina	Mountain	290 Main Ave.	11/7/2013	RELIGION; ARCHITECTURE; EUROPEAN; EXPLORATION/SETTLEMENT; SOCIAL HISTORY
Grace Episcopal Church	Pembina	Pembina	152 Ramsey St. W.	9/2/1994	ARCHITECTURE
Icelandic Evangelical Lutheran Church	Pembina	Pembina	415 Beaupre St. (AKA Adelaide St.)	12/5/2019	RELIGION; ARCHITECTURE; ETHNIC HERITAGE; EUROPEAN; SOCIAL HISTORY
US Customs House and Post Office-Pembina	Pembina	Pembina	125 S. Cavalier St.	11/1/1989	COMMUNITY PLANNING AND DEVELOPMENT; ECONOMICS; POLITICS/GOVERNMENT; ARCHITECTURE
O'Connor House	Pembina	St. Thomas	Off US 81	7/3/1980	ARCHITECTURE
Gingras House and Trading Post	Pembina	Walhalla	NE of Walhalla off ND 32	5/21/1975	COMMERCE; ARCHITECTURE
Walla Theater	Pembina	Walhalla	909 Central Ave	5/17/2010	ENTERTAINMENT/RECREATION; SOCIAL HISTORY
Great Northern Passenger Depot	Pierce	Rugby	201 W. Dewey St.	9/26/1991	TRANSPORTATION; ARCHITECTURE
Pierce County Courthouse	Pierce	Rugby	In Rugby	11/25/1980	POLITICS/GOVERNMENT; ARCHITECTURE
St. Paul's Episcopal Church	Pierce	Rugby	404 DeSmet St.	12/3/1992	ARCHITECTURE
US Post Office-Rugby	Pierce	Rugby	205 SE. Second St.	11/1/1989	COMMUNITY PLANNING AND DEVELOPMENT; ART; ECONOMICS; POLITICS/GOVERNMENT; ARCHITECTURE
Bangs-Wineman Block	Ramsey	Devils Lake	402--408 Fourth St.	11/14/1985	COMMERCE; ARCHITECTURE

Property Name	County	City	Street & Number	Listed Date	Area of Significance
Central High School	Ramsey	Devils Lake	325 Seventh St.	12/29/2003	ARCHITECTURE; EDUCATION
Devils Lake Carnegie Library	Ramsey	Devils Lake	623 4th Ave.	3/6/2002	ARCHITECTURE; EDUCATION; SOCIAL HISTORY
Devils Lake Masonic Temple	Ramsey	Devils Lake	403 Sixth St.	9/1/2001	ARCHITECTURE
Locke Block	Ramsey	Devils Lake	405 Fifth St.	7/24/1986	ARCHITECTURE
Methodist Episcopal Church	Ramsey	Devils Lake	601 5th St. NE.	7/16/2008	ARCHITECTURE
Newport Apartments	Ramsey	Devils Lake	601 Seventh St.	7/11/1988	COMMUNITY PLANNING AND DEVELOPMENT; ARCHITECTURE
Ramsey County Sheriff's House	Ramsey	Devils Lake	420 6th St.	1/31/1978	POLITICS/GOVERNMENT; ARCHITECTURE
St. Mary's Academy	Ramsey	Devils Lake	E. 7th St.	2/24/1983	EDUCATION; ARCHITECTURE
St. Olaf Lutheran Church	Ramsey	Devils Lake	601 6th St., NE.	3/23/2015	ARCHITECTURE
US Post Office and Courthouse	Ramsey	Devils Lake	502 4th St.	6/22/1978	POLITICS/GOVERNMENT; ARCHITECTURE
Westminster Presbyterian Church	Ramsey	Devils Lake	501 5th St. NE.	7/16/2008	ARCHITECTURE
Episcopal Church of the Advent-Guild Hall	Ramsey	Devil's Lake	501 6th St. E.	6/20/2002	ARCHITECTURE; EXPLORATION/SETTLEMENT
Bradford Hotel	Ransom	Lisbon	18 Fourth Ave. W.	10/1/1987	COMMERCE
Lisbon Opera House	Ransom	Lisbon	413 Main Ave.	10/18/1979	COMMERCE; ARCHITECTURE; SOCIAL HISTORY; PERFORMING ARTS
Ransom County Courthouse	Ransom	Lisbon	Fifth Ave. W	11/25/1985	POLITICS/GOVERNMENT; ARCHITECTURE
US Post Office-Lisbon	Ransom	Lisbon	17 W. Fourth Ave.	11/1/1989	COMMUNITY PLANNING AND DEVELOPMENT; ECONOMICS; POLITICS/GOVERNMENT; ARCHITECTURE
Mizpah Lodge Building	Ransom	Sheldon	260 Front St.	8/24/2005	ARCHITECTURE; COMMERCE; SOCIAL HISTORY
Renville County Courthouse	Renville	Mohall	Main St.	11/25/1985	POLITICS/GOVERNMENT; ARCHITECTURE
Nelson's Grocery	Richland	Christine	Main and 3rd Sts.	10/5/1977	COMMERCE; ARCHITECTURE

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Post Office	Richland	Christine	Main and 3rd Sts.	10/5/1977	POLITICS/GOVERNMENT; ARCHITECTURE
South Wild Rice Church	Richland	Galchutt	SE of Galchutt at US 81 and CR 8	10/22/1982	EXPLORATION/SETTLEMENT; RELIGION
St. Alban's Episcopal Church	Richland	Lidgerwood	Jct. of Hammond and Eastern Aves., SW corner	12/3/1992	ARCHITECTURE
Adams-Fairview Bonanza Farm	Richland	Wahepton	17170 82 R St. SE	11/20/1990	INDUSTRY; AGRICULTURE; EXPLORATION/SETTLEMENT; ARCHITECTURE
Leach Public Library	Richland	Wahpeton	417 Second Ave. N.	1/26/1990	EDUCATION; ARCHITECTURE; SOCIAL HISTORY
Red River Valley University	Richland	Wahpeton	N. 6th St.	4/26/1984	EDUCATION
Richland County Courthouse	Richland	Wahpeton	Off ND 13	11/25/1980	POLITICS/GOVERNMENT; ARCHITECTURE
US Post Office-Wahpeton	Richland	Wahpeton	620 Dakota Ave.	11/1/1989	COMMUNITY PLANNING AND DEVELOPMENT; ECONOMICS; POLITICS/GOVERNMENT; ARCHITECTURE
Wahpeton Hospital	Richland	Wahpeton	720-722 Dakota Ave.	9/29/1983	HEALTH/MEDICINE; ARCHITECTURE
Cote, Urbain, Round Barn	Rolette	Dunseith	ND 38	10/7/1986	ARCHITECTURE
Coghlan Castle	Rolette	St. John	Lot 2, SW 1/4 of the NW 1/4 T163N R69W Section 19	7/16/2008	ARCHITECTURE; EXPLORATION/SETTLEMENT; EUROPEAN
U.S. Inspection Station-St. John, North Dakota	Rolette	St. John	ND 30	9/10/2014	ARCHITECTURE; POLITICS/GOVERNMENT
Sargent County Courthouse	Sargent	Forman	Off ND 32	11/25/1980	POLITICS/GOVERNMENT; ARCHITECTURE
Clark House	Sheridan	Goodrich	322 McKinley Ave.	6/25/2013	ARCHITECTURE
Sheridan County Courthouse	Sheridan	McClusky	215 E. Second St.	11/25/1985	POLITICS/GOVERNMENT; ARCHITECTURE
H-T Ranch	Slope	Amidon	10 mi. W of Amidon	7/5/1985	AGRICULTURE; ARCHITECTURE
Mystic Theatre	Slope	Marmarth	Main St.	9/13/1977	ENTERTAINMENT/RECREATION; ARCHITECTURE
Dickinson (Carnegie Area) Public Library	Stark	Dickinson	139 3rd St. W.	7/31/2008	ARCHITECTURE; EDUCATION; SOCIAL HISTORY

Property Name	County	City	Street & Number	Listed Date	Area of Significance
Elks Club and Store Building-Dickenson Lodge #1137	Stark	Dickinson	103 1st Ave. W.	4/11/2008	EDUCATION; COMMERCE; SOCIAL HISTORY
Stark County Courthouse	Stark	Dickinson	Third St. N	11/25/1985	POLITICS/GOVERNMENT; ARCHITECTURE
US Post Office-Dickinson	Stark	Dickinson	15 E. First St.	11/1/1989	COMMUNITY PLANNING AND DEVELOPMENT; ECONOMICS; POLITICS/GOVERNMENT; ARCHITECTURE
US Post Office-Dickinson	Stark	Dickinson	16 E. First St.	11/2/1989	COMMUNITY PLANNING AND DEVELOPMENT; ECONOMICS; POLITICS/GOVERNMENT; ARCHITECTURE
Baldwin's Arcade	Steele	Hope	Steele Ave. and 3rd St.	2/18/1975	COMMERCE; ARCHITECTURE; SOCIAL HISTORY
Dickey, Alfred, Free Library	Stutsman	Jamestown	105 3rd St., SE	7/3/1980	EDUCATION; ARCHITECTURE
Elizabeth Apartments	Stutsman	Jamestown	402 Second Ave. NW	4/21/1986	INDUSTRY; ARCHITECTURE; SOCIAL HISTORY
Franklin School	Stutsman	Jamestown	308 Second St. SW	5/9/2002	ARCHITECTURE; EDUCATION
Grace Episcopal Church	Stutsman	Jamestown	Jct. of 2nd Ave. NE. and 4th St. NE., NW corner	12/3/1992	EXPLORATION/SETTLEMENT; ARCHITECTURE
Seiler Building	Stutsman	Jamestown	110 First St. E	1/16/1986	COMMERCE; ARCHITECTURE
St. James Catholic Church	Stutsman	Jamestown	622 1st Ave., S.	10/22/1982	ARCHITECTURE
Stutsman County Courthouse and Sheriff's Residence/Jail	Stutsman	Jamestown	504 3rd Ave., SE	9/8/1976	POLITICS/GOVERNMENT; ARCHITECTURE
Voorhees Chapel	Stutsman	Jamestown	Jamestown College campus	7/22/1977	EDUCATION; ARCHITECTURE; PERFORMING ARTS
Brown, Stephen William, Stone House	Stutsman	Montpelier	4829 75 R Ave., SE	2/4/2004	ARCHITECTURE; AGRICULTURE; EXPLORATION/SETTLEMENT
Towner County Courthouse	Towner	Cando	Second St. S	11/14/1985	POLITICS/GOVERNMENT; ARCHITECTURE

Property Name	County	City	Street & Number	Listed Date	Area of Significance
First State Bank of Buxton	Traill	Buxton	423 Broadway St.	2/14/1978	ECONOMICS; EXPLORATION/SETTLEMENT; ARCHITECTURE
Eielson, Carl Ben, House	Traill	Hatton	405 8th St.	4/11/1977	TRANSPORTATION; ARCHITECTURE
Ness, Andres O., House	Traill	Hatton	Oak Ave. and 6th St.	7/15/1977	EUROPEAN; EXPLORATION/SETTLEMENT; ARCHITECTURE
Ellingson Farm District	Traill	Hillsboro	1 mi. N and 2.5 mi. W of Hillsboro	9/12/1985	AGRICULTURE; ARCHITECTURE
Plummer, Amos and Lillie, House	Traill	Hillsboro	306 W. Caledonia Ave.	1/4/1996	ARCHITECTURE
Traill County Courthouse	Traill	Hillsboro	Off U.S. 81	11/25/1980	POLITICS/GOVERNMENT; ARCHITECTURE
Delchar Theater	Traill	Mayville	20 W. Main St.	11/14/1985	ENTERTAINMENT/RECREATION
First National Bank	Traill	Mayville	22 W. Main St.	11/20/1985	ARCHITECTURE
Goose River Bank	Traill	Mayville	45 Main St. E	11/14/1985	COMMERCE; ARCHITECTURE
Great Northern Railway Depot	Traill	Mayville	Front St.	10/5/1977	TRANSPORTATION; ARCHITECTURE
Grinager Mercantile Building	Traill	Mayville	37 Main St. E	11/20/1985	ARCHITECTURE
Lura Building	Traill	Mayville	29 W. Main St.	11/14/1985	COMMERCE; ARCHITECTURE
Mayville Public Library	Traill	Mayville	Center Ave., N.	4/11/1977	EDUCATION; ARCHITECTURE; SOCIAL HISTORY
Robinson, Col. William H., House	Traill	Mayville	127 4th Ave., NE	4/11/1977	POLITICS/GOVERNMENT; ARCHITECTURE
Stomner House	Traill	Mayville	32 3rd St., NE	10/11/1979	EXPLORATION/SETTLEMENT; POLITICS/GOVERNMENT; ARCHITECTURE
Union Block	Traill	Mayville	21--25 Main St. W	11/20/1985	ARCHITECTURE
District No. 70-Hoff Rural School	Walsh	Adams	Fire No. 6591 123rd Ave. NE (Norton Township)	3/20/2008	EDUCATION; SOCIAL HISTORY
Edinburg WPA Auditorium	Walsh	Edinburg	67 Main St.	11/7/2013	ARCHITECTURE; SOCIAL HISTORY; ENTERTAINMENT/RECREATION
State Bank of Edinburg	Walsh	Edinburg	300 Main Ave.	5/30/2001	ARCHITECTURE; COMMERCE
Elmwood	Walsh	Grafton	P.O. Box 654	2/21/1985	ARCHITECTURE

Property Name	County	City	Street & Number	Listed Date	Area of Significance
Strand Theatre	Walsh	Grafton	618 Hill Ave.	4/14/2004	ARCHITECTURE; ENTERTAINMENT/RECREATION
US Post Office-Grafton	Walsh	Grafton	506 S. Griggs Ave.	11/1/1989	COMMUNITY PLANNING AND DEVELOPMENT; ECONOMICS; POLITICS/GOVERNMENT; ARCHITECTURE
Walsh County Courthouse	Walsh	Grafton	638 Cooper Ave.	11/25/1985	ARCHITECTURE
Minto School	Walsh	Minto	Jct. of Major Ave. and Third St.	1/30/1992	EDUCATION; ARCHITECTURE
St. Joseph's Chapel	Walsh	Minto	Between I-29 and the Red R., E of Minto, Pulaski Township	6/2/1994	ARCHITECTURE; RELIGION; EUROPEAN
Nordre Trefoldegheds Menigheds	Walsh	Nash	6 mi. W and 3/8 mi. S of jct. of US 81 and Cty Rte. 9	2/20/2004	EXPLORATION/SETTLEMENT; ARCHITECTURE
Pisek School	Walsh	Pisek	E end of Main St. at Lovick Ave.	3/17/1994	ARCHITECTURE
St. Catherine's Church of Lomice, North Dakota	Walsh	Whitman	4 mi. W and 2 mi. S of jct. ND 35 and Cty Rte 15	4/12/2006	ARCHITECTURE; LANDSCAPE ARCHITECTURE; SOCIAL HISTORY
Our Savior's Scandinavian Lutheran Church	Ward	Coulee	1 mi. N of NM 50 and 0.25 mi. W of Ward Cty Hwy 1	2/15/2005	ARCHITECTURE; EXPLORATION/SETTLEMENT; EUROPEAN
Carr, Andrew, Sr., House	Ward	Minot	510 4th Ave., NW	4/26/1984	SCIENCE; ARCHITECTURE; SOCIAL HISTORY
Minot Carnegie Library	Ward	Minot	105 2nd Ave., SE	11/10/1980	ARCHITECTURE
Soo Line Passenger Depot	Ward	Minot	11 N. Main St.	1/20/1978	TRANSPORTATION; ARCHITECTURE
South Prairie Community Hall	Ward	Minot	177th Ave. SW	6/7/2006	SOCIAL HISTORY; ENTERTAINMENT/RECREATION
Tufveson House	Ward	Minot	426 4th Ave., NW	4/12/1984	ARCHITECTURE
U.S. Post Office	Ward	Minot	100 1st St., SW	10/14/1980	POLITICS/GOVERNMENT
Union National Bank and Annex	Ward	Minot	2 N. Main and 7-11 E. Central Ave.	1/27/1983	COMMERCE; ARCHITECTURE
Ward County Courthouse	Ward	Minot	315 Third St. SE	11/14/1985	POLITICS/GOVERNMENT; ARCHITECTURE
Westland Oil Filling Station	Ward	Minot	510 E. Central Ave.	2/27/1987	TRANSPORTATION; ARCHITECTURE

Property Name	County	City	Street & Number	Listed Date	Area of Significance
Glick, Levi, Round Barn	Ward	Surrey	ND 38	3/25/1987	ARCHITECTURE
Beiseker Mansion	Wells	Fessenden	2nd St. and Roberts Ave.	4/13/1977	ECONOMICS; ARCHITECTURE; SOCIAL HISTORY
Wells County Courthouse	Wells	Fessenden	Railway St., N.	9/15/1977	POLITICS/GOVERNMENT; ARCHITECTURE
Harvey Power Plant	Wells	Harvey	SE corner of US 52 Bus. and Judy Blvd.	6/5/2020	INDUSTRY
Hurd Round House	Wells	Hurdsfield	7 mi. SE of Hurdsfield	4/11/1977	EXPLORATION/SETTLEMENT; ARCHITECTURE
Vang Evangelical Lutheran Church	Wells	Manfred	200 W. LeGrand St.	6/21/2001	EUROPEAN; SOCIAL HISTORY; ARCHITECTURE
Ray Opera House	Williams	Ray	111 Main St.	11/2/1978	ENTERTAINMENT/RECREATION; ARCHITECTURE; SOCIAL HISTORY
Creaser Building	Williams	Williston	224 Main St.	7/11/2016	ARCHITECTURE
James Memorial Library	Williams	Williston	621 1st Ave., W.	11/14/1979	ARCHITECTURE; SOCIAL HISTORY
Old Armory	Williams	Williston	320 1st Ave., E.	4/11/1985	ARCHITECTURE
Old US Post Office	Williams	Williston	322 Main Ave.	10/22/1979	POLITICS/GOVERNMENT; ARCHITECTURE
Williston High School	Williams	Williston	612 1st Ave. W.	6/27/2011	ARCHITECTURE; EDUCATION

Historic Districts

Property Name	County	City	Street & Number	Listed Date	Area of Significance
State Normal School at Valley City Historic District	Barnes	Valley City	Roughly bounded by College St., SE., Second Ave.,SE.,Viking Dr. and Second Ave., SW.	2/10/1995	ARCHITECTURE; COMMUNITY PLANNING AND DEVELOPMENT; EDUCATION
Custer Military Trail Historic Archeological District	Billings	Medora	Address Restricted	6/5/2009	EXPLORATION/SETTLEMENT; MILITARY; HISTORIC - NON-ABORIGINAL
Roosevelt's, Theodore, Elkhorn Ranch and Greater Elkhorn Ranchlands	Billings	Medora	Address Restricted	9/28/2012	CONSERVATION; HISTORIC - NON-ABORIGINAL
Crogen, Ole, Farm District	Bottineau	Carbury & Bottineau	4 mi. NW of Bottineau	10/16/1987	AGRICULTURE
Bismarck Cathedral Area	Burleigh	Bismarck	Roughly bounded by Hannifan and N 1st Sts., Aves. C and A West	5/8/1980	ARCHITECTURE

Property Name	County	City	Street & Number	Listed Date	Area of Significance
Historic District					
Bismarck Cathedral Area Historic District (Boundary Increase II)	Burleigh	Bismarck	104,106,112,115,116,120 E Ave B & 523 N 1st St (Remove 316,320 W Ave A & 510 N Washington St)	3/31/2010	COMMUNITY PLANNING AND DEVELOPMENT; ARCHITECTURE
Bismarck Cathedral Area Historic District (Boundary Increase)	Burleigh	Bismarck	Roughly along N. First, N. Mandan, N. Washington, and N. Raymond Sts., and Aves. C, D, and E West	10/24/1997	ARCHITECTURE
Downtown Bismarck Historic District	Burleigh	Bismarck	Roughly bounded by Broadway and Thayer Aves., 5th St., Burlington and Santa Fe RR corridor, Washington and 2nd Sts.	10/28/2001	COMMERCE; ARCHITECTURE; INDUSTRY; TRANSPORTATION; POLITICS/GOVERNMENT
Highland Acres Historic District	Burleigh	Bismarck	Roughly bounded by Shafer St., Edwards Ave., the axis of Williams St., and South Highland Acres Rd.	7/6/2022	ARCHITECTURE; COMMUNITY PLANNING AND DEVELOPMENT
Casselton Commercial Historic District	Cass	Casselton	Roughly bounded by Front and 1st St. between 6th and 8th Ave.	10/28/1982	COMMERCE; ARCHITECTURE
Beebe, M.E., Historic District	Cass	Fargo	NE. corner of 3rd Ave., N. & N. 8th St.	11/24/2015	ARCHITECTURE; COMMERCE
Downtown Fargo District	Cass	Fargo	Roughly Roberts St., from S. 1st Ave. to 5th Ave. N., and Main Ave.	10/13/1983	COMMERCE; ARCHITECTURE
Fargo Oak Grove Residential Historic District	Cass	Fargo	N. & S. Terrace Aves., E. of Elm St., N.	10/13/2011	COMMUNITY PLANNING AND DEVELOPMENT; TRANSPORTATION; SOCIAL HISTORY; ARCHITECTURE
Fargo South Residential District	Cass	Fargo	Roughly bounded by 5th and 17th Aves. S., 7th and 9th Sts. S.	9/19/1983	ARCHITECTURE
North Dakota State University District	Cass	Fargo	Roughly bounded by N. University Dr., Twelfth Ave. N, Service Dr., and Campus Ave.	10/6/1986	EDUCATION; ARCHITECTURE

Property Name	County	City	Street & Number	Listed Date	Area of Significance
North Side Fargo Builder's Residential Historic District	Cass	Fargo	Roughly bounded by Benjamin Franklin School area and Golf Course, First St., Twelfth Ave. N, and Fourth St.	4/7/1987	COMMUNITY PLANNING AND DEVELOPMENT; ARCHITECTURE
North Side Fargo High Style Residential Historic District	Cass	Fargo	Roughly bounded by Twelfth Ave. N, Fourth St., Eleventh Ave. N, and Seventh St.	4/7/1987	COMMUNITY PLANNING AND DEVELOPMENT; ARCHITECTURE
Hutmacher Farm	Dunn	Manning	NW of Manning	12/17/1979	EXPLORATION/SETTLEMENT; ARCHITECTURE
St. Mary's Church Non-Contiguous Historic District	Emmons	Hague	Off ND 11	10/13/1983	ART; EUROPEAN; ARCHITECTURE; RELIGION
Hall, Ralph, Farm District	Foster	Carrington	N of Carrington on W side of Burlington Northern RR tracks	10/1/1987	ARCHITECTURE
Downtown Grand Forks Historic District	Grand Forks	Grand Forks	Downtown Grand Forks, at the Red River of the North	12/28/2005	ARCHITECTURE; COMMUNITY PLANNING AND DEVELOPMENT; POLITICS/GOVERNMENT; TRANSPORTATION
Grand Forks Near Southside Historic District	Grand Forks	Grand Forks	Roughly bounded by ND 697, Red River, 13th Ave. and Cottonwood St.	7/28/2004	ARCHITECTURE; COMMUNITY PLANNING AND DEVELOPMENT
Grand Forks Riverside Neighborhood Historic District	Grand Forks	Grand Forks	N of US 2 (Gateway Dr. and W of the Red River	11/15/2007	ARCHITECTURE; COMMUNITY PLANNING AND DEVELOPMENT; ENTERTAINMENT/RECREATION; TRANSPORTATION
University of North Dakota Historic District	Grand Forks	Grand Forks	University of North Dakota	1/13/2010	EDUCATION; ARCHITECTURE; LANDSCAPE ARCHITECTURE
Denbigh Station and Experimental Forest	McHenry	Denbigh	Address Restricted	6/24/2010	CONSERVATION
St. Andrews Evangelical German	McIntosh	Zeeland	W of SR 3 near S. Branch, Beaver Cr.	7/12/1990	EUROPEAN; EXPLORATION/SETTLEMENT; ARCHITECTURE

Property Name	County	City	Street & Number	Listed Date	Area of Significance
Lutheran Church					
Knife River Indian Villages National Historic Site Archeological District	Mercer	Stanton	Address Restricted	10/26/1974	PREHISTORIC; HISTORIC - ABORIGINAL; EXPLORATION/SETTLEMENT
Mandan Commercial Historic District	Morton	Mandan	Roughly bounded by Main and 1st Sts. between 1st Ave., NE and 4th Ave., NW	2/21/1985	COMMERCE; TRANSPORTATION; ARCHITECTURE
Cross Ranch Archeological District	Oliver	Hensler	Cross Ranch Nature Preserve	11/4/1985	PREHISTORIC; HISTORIC - ABORIGINAL; HISTORIC - NON-ABORIGINAL
Dease-Martineau House, Trading Post, and Oxcart Trail Segments	Pembina	Leroy	13565 105th St. NE.	12/22/2017	TRANSPORTATION; ARCHITECTURE; COMMERCE; EXPLORATION/SETTLEMENT; POLITICS/GOVERNMENT; ARCHEOLOGY; HISTORIC - ABORIGINAL; HISTORIC - NON-ABORIGINAL
Devils Lake Commercial District	Ramsey	Devils Lake	Roughly bounded by 2nd Ave., 5th St., 5th Ave., 3rd St., and Railroad Ave.	10/24/1989	COMMERCE; POLITICS/GOVERNMENT; ARCHITECTURE; SOCIAL HISTORY
Walker, T. J., Historic District	Ransom	Fort Ransom	At Sheyenne River	12/5/1979	INDUSTRY; COMMERCE; ARCHITECTURE
Bagg, Frederick A. and Sophia, Bonanza Farm	Richland	Mooreton	Off ND 13 on Section Rd., 32 RI 5	11/14/1985	AGRICULTURE
Dickinson State Normal School Campus District	Stark	Dickinson	Roughly bounded by State Ave., Fairway St., 8th Ave., W., and 2nd St., W.	3/28/1997	ARCHITECTURE; EDUCATION; LANDSCAPE ARCHITECTURE
Jamestown Historic District	Stutsman	Jamestown	Roughly bounded by First St., Fourth Ave., SE, Fifth St., and Second Ave.	9/8/1989	INDUSTRY; COMMERCE; EDUCATION; POLITICS/GOVERNMENT; ARCHITECTURE
Grandins' Mayville Farm District	Traill	Mayville	2 Brunsdale W	11/19/1985	AGRICULTURE; EXPLORATION/SETTLEMENT

Property Name	County	City	Street & Number	Listed Date	Area of Significance
Mayville Historic District	Traill	Mayville	Roughly bounded by Third St. NE, Fifth Ave. NE, Main St. E, and Third Ave. NE and Second Ave. NE	11/19/1985	EDUCATION; ARCHITECTURE
Lucken Farm	Traill	Portland	N of Portland	5/14/1986	AGRICULTURE; ARCHITECTURE
Grafton State School	Walsh	Grafton	700 6th St., W.	11/6/1996	EDUCATION; HEALTH/MEDICINE
Ridge Trail Historic District	Walsh	Kensington	Address Restricted	3/17/2006	HISTORIC - ABORIGINAL; HISTORIC - NON-ABORIGINAL; COMMERCE; NATIVE AMERICAN; EUROPEAN; TRANSPORTATION
St. Stanislaus Church Historic District	Walsh	Warsaw	Off I-29	8/3/1979	EDUCATION; EUROPEAN; ARCHITECTURE; RELIGION
Eastwood Park Historic District	Ward	Minot	Bounded by Old Souris Oxbow	10/16/1986	ARCHITECTURE
Minot Commercial Historic District	Ward	Minot	Roughly bounded by Soo Line RR tracks, Burdick Expressway, and Broadway	10/16/1980	COMMUNITY PLANNING AND DEVELOPMENT; COMMERCE; TRANSPORTATION; ARCHITECTURE
Minot Industrial Historic District	Ward	Minot	Roughly bounded by Souris River, Burlington Northern RR, 1st Ave., Front & Broadway Sts.	10/16/1986	INDUSTRY; COMMERCE; TRANSPORTATION
Wells County Fairgrounds	Wells	Fessenden	Jct. of US 52 and ND 15	2/28/1991	ENTERTAINMENT/RECREATION; EXPLORATION/SETTLEMENT; ARCHITECTURE
Manfred Historic District	Wells	Manfred	All of the original town of Manfred & the LeGrand's Addition	11/13/2017	EXPLORATION/SETTLEMENT; SOCIAL HISTORY

Historic Sites

Property Name	County	City	Street & Number	Listed Date	Area of Significance
St. Boniface Cemetery, Wrought-Iron Cross Site	Benson	Selz	Address Restricted	#########	ART; EUROPEAN; EXPLORATION/SETTLEMENT; RELIGION

Property Name	County	City	Street & Number	Listed Date	Area of Significance
De Mores Memorial Park	Billings	Medora	SE corner of Main St. & 3rd Ave.	3/4/2019	LANDSCAPE ARCHITECTURE; ART; SOCIAL HISTORY
De Mores Packing Plant Ruins	Billings	Medora	NW of Medora boundary	2/18/1975	COMMERCE; AGRICULTURE; TRANSPORTATION
Initial Rock	Billings	Medora	SE of Medora in Custer National Forest	11/7/1976	MILITARY
Fort Dilts	Bowman	Rhame	Address Unknown	#########	TRANSPORTATION; EXPLORATION/SETTLEMENT
Camp Hancock Site	Burleigh	Bismarck	101 Main Ave.	2/23/1972	MILITARY
Chief Looking's Village site (32BL3)	Burleigh	Bismarck	Eastern edge of Pioneer Park	#########	PREHISTORIC
Double Ditch State Historic Site	Burleigh	Bismarck	Address Restricted	1/29/1979	PREHISTORIC; HISTORIC - ABORIGINAL
Menoken Indian Village Site	Burleigh	Menoken	Address Restricted	#########	PREHISTORIC
Shea Site	Cass	Embden	Address Restricted	7/25/1996	PREHISTORIC
Sprunk Site (32CS04478)	Cass	Enderlin	Address Restricted	1/9/2007	PREHISTORIC; EXPLORATION/SETTLEMENT
Research Plot 2	Cass	Fargo	Near jct. of Centennial Ave. and 18th St. N., North Dakota State University campus	10/8/1991	AGRICULTURE; INVENTION
Research Plot 30	Cass	Fargo	Near jct. of Centennial Ave. and 18th St. N., North Dakota State University campus	10/8/1991	INVENTION; AGRICULTURE

Property Name	County	City	Street & Number	Listed Date	Area of Significance
White Stone Hill	Dickey	Kulm	Address Restricted	11/5/2013	HISTORIC - ABORIGINAL; HISTORIC - NON-ABORIGINAL; MILITARY; NATIVE AMERICAN; ARCHITECTURE
Lynch Quarry Site	Dunn	Redacted	Address Restricted	7/13/2011	PREHISTORIC
Old St. Mary's Cemetery, Wrought-Iron Cross Site	Emmons	Hague	Address Restricted	#########	ART; EUROPEAN; EXPLORATION/SETTLEMENT; RELIGION
St. Aloysius Cemetery, Wrought-Iron Cross Site A	Emmons	Hague	Address Restricted	#########	ART; EUROPEAN; EXPLORATION/SETTLEMENT; RELIGION
St. Aloysius Cemetery, Wrought-Iron Cross Site B	Emmons	Hague	Address Restricted	#########	ART; EUROPEAN; EXPLORATION/SETTLEMENT; RELIGION
St. Mary's Cemetery, Wrought-Iron Cross Site A	Emmons	Hague	Address Restricted	#########	ART; EUROPEAN; EXPLORATION/SETTLEMENT; RELIGION
St. Mary's Cemetery, Wrought-Iron Cross Site B	Emmons	Hague	Address Restricted	#########	ART; EUROPEAN; EXPLORATION/SETTLEMENT; RELIGION
St. Mary's Cemetery, Wrought-Iron Cross Site C	Emmons	Hague	Address Restricted	#########	ART; EUROPEAN; EXPLORATION/SETTLEMENT; RELIGION
Sacred Heart Cemetery, Wrought-Iron Cross Site	Emmons	Linton	Address Restricted	#########	ART; EUROPEAN; EXPLORATION/SETTLEMENT; RELIGION
Holy Trinity Cemetery, Wrought-Iron Cross Site A	Emmons	Strasburg	Address Restricted	#########	ART; EUROPEAN; EXPLORATION/SETTLEMENT; RELIGION
Holy Trinity Cemetery, Wrought-Iron Cross Site B	Emmons	Strasburg	Address Restricted	#########	ART; EUROPEAN; EXPLORATION/SETTLEMENT; RELIGION

Property Name	County	City	Street & Number	Listed Date	Area of Significance
Holy Trinity Cemetery, Wrought-Iron Cross Site C	Emmons	Strasburg	Address Restricted	#########	ART; EUROPEAN; EXPLORATION/SETTLEMENT; RELIGION
Holy Trinity Cemetery, Wrought-Iron Cross Site D	Emmons	Strasburg	Address Restricted	#########	ART; EUROPEAN; EXPLORATION/SETTLEMENT; RELIGION
Tirsbol Cemetery, Wrought-Iron Cross Site	Emmons	Strasburg	Address Restricted	#########	ART; EUROPEAN; EXPLORATION/SETTLEMENT; RELIGION
Medicine Rock State Historic Site	Grant	Heil	Address Restricted	9/25/1986	RELIGION
Old Saints Peter and Paul Cemetery, Wrought-Iron Cross Site	McHenry	Karlsruhe	Address Restricted	#########	ART; EUROPEAN; EXPLORATION/SETTLEMENT; RELIGION
Old Saint John Nepomocene Cemetery, Wrought-Iron Cross Site	McHenry	Orrin	Address Restricted	#########	ART; EUROPEAN; EXPLORATION/SETTLEMENT; RELIGION
Ashley Jewish Homesteaders Cemetery	McIntosh	Ashley	48th Ave., SE.	#########	RELIGION; SOCIAL HISTORY; AGRICULTURE; EXPLORATION/SETTLEMENT
St. John's Cemetery, Wrought-Iron Cross Site A	McIntosh	Zeeland	Address Restricted	#########	ART; EUROPEAN; EXPLORATION/SETTLEMENT; RELIGION
St. John's Cemetery, Wrought-Iron Cross Site B	McIntosh	Zeeland	Address Restricted	#########	ART; EUROPEAN; EXPLORATION/SETTLEMENT; RELIGION
St. John's Cemetery, Wrought-Iron Cross Site C	McIntosh	Zeeland	Address Restricted	#########	ART; EUROPEAN; EXPLORATION/SETTLEMENT; RELIGION

Property Name	County	City	Street & Number	Listed Date	Area of Significance
St. John's Cemetery, Wrought-Iron Cross Site D	McIntosh	Zeeland	Address Restricted	#########	ART; EUROPEAN; EXPLORATION/SETTLEMENT; RELIGION
Zion Lutheran Cemetery, Wrought-Iron Cross Site	McLean	Mercer	Address Restricted	#########	ART; EUROPEAN; EXPLORATION/SETTLEMENT; RELIGION
Fort Buford Stage Road	McLean	Washburn	Fort Buford Stage Rd.	#########	ARCHEOLOGY; HISTORIC - NON-ABORIGINAL; MILITARY; TRANSPORTATION; COMMERCE; ETHNIC HERITAGE; EUROPEAN
High Butte Effigy and Village Site (32ME13)	Mercer	Riverdale	Address Restricted	5/22/1978	PREHISTORIC
Big Hidatsa Village Site	Mercer	Stanton	N bank of Knife River, 1 mi. N of Stanton	#########	HISTORIC - ABORIGINAL; NATIVE AMERICAN; EXPLORATION/SETTLEMENT
Fort Clark Archeological District	Mercer	Stanton	North Dakota Highway 200 Alternate	#########	HISTORIC - ABORIGINAL; HISTORIC - NON-ABORIGINAL; EXPLORATION/SETTLEMENT; SCIENCE
Huff State Historic Site (32MO11)	Morton	Huff	SE of Huff	7/23/1980	PREHISTORIC
Evans Site	Mountrail	New Town	Address Restricted	2/8/1980	PREHISTORIC
Assyrian Muslim Cemetery	Mountrail	Ross	1/4 mi. S of US 2 on 87th Ave. NW	7/17/2018	EXPLORATION/SETTLEMEN; RELIGION; SOCIAL HISTORY
Old Mt. Carmel Cemetery, Wrought-Iron Cross Site	Pierce	Balta	Address Restricted	#########	ART; EUROPEAN; EXPLORATION/SETTLEMENT; RELIGION

Property Name	County	City	Street & Number	Listed Date	Area of Significance
St. Anselm's Cemetery, Wrought-Iron Cross Site	Pierce	Berwick	Address Restricted	#########	ART; EUROPEAN; EXPLORATION/SETTLEMENT; RELIGION
St. Mathias Cemetery, Wrought-Iron Cross Site	Pierce	Orrin	Address Restricted	#########	ART; EUROPEAN; EXPLORATION/SETTLEMENT; RELIGION
Sons of Jacob Cemetery	Ramsey	Garske	88th Ave. NE., 1/4 mi. N. of 67th St. NE.	6/5/2017	AGRICULTURE; EXPLORATION/SETTLEMENT; RELIGION; SOCIAL HISTORY
Biesterfeldt Site (32RM1)	Ransom	Lisbon	Address Restricted	2/8/1980	HISTORIC - ABORIGINAL
Biesterfeldt Site (32RM1)	Ransom	Lisbon	Address Restricted		HISTORIC - ABORIGINAL
Mckinney Cemetery	Renville	Tolley	N of Tolley	#########	COMMERCE; EXPLORATION/SETTLEMENT
Fort Abercrombie	Richland	Abercrombie	Richland Co. Rte. 4	1/22/2009	MILITARY; EXPLORATION/SETTLEMENT; SOCIAL HISTORY; HISTORIC - NON-ABORIGINAL
Fort Buford State Historic Site	Williams	Williston	SW of Williston at confluence of Yellowstone and Missouri Rivers	4/1/1975	NATIVE AMERICAN; MILITARY; TRANSPORTATION
Fort Union Trading Post National Historic Site	Williams	Williston	1550 Highway 1804	#########	HISTORIC - NON-ABORIGINAL; EXPLORATION/SETTLEMENT

Historic Structures

Property Name	County	City	Street & Number	Listed Date	Area of Significance
Cedar Creek Bridge	Adams	Haynes	Across Cedar Cr., unnamed co. rd., approximately 6 mi. N and 11 mi. E of Haynes	2/27/1997	ENGINEERING; TRANSPORTATION

Property Name	County	City	Street & Number	Listed Date	Area of Significance
West Park Bridge	Barnes	Valley City	4th St., SW, across the Sheyenne River	2/27/1997	ENGINEERING; TRANSPORTATION
West Antelope Bridge	Benson	Flora	Across the Sheyenne River, unnamed co. rd., approximately 30 mi. SE of jct. of ND 30 and US 2	2/27/1997	ENGINEERING; TRANSPORTATION
Myers School Timbered Lodge (32BI401)	Billings	Medora	Address Restricted	8/6/1980	HISTORIC - ABORIGINAL; ARCHITECTURE
RSL-3	Cavalier	Concrete	12329 ND 5	#########	MILITARY; COMMUNICATIONS; POLITICS/GOVERNMENT
New Rockford Bridge	Eddy	New Rockford	Across the James River, unnamed co. rd., jct. with ND 15	3/13/1997	ENGINEERING; TRANSPORTATION
Grace City Bridge	Foster	Grace City	Across the James River, unnamed co. rd., 1 mi. SW of Grace City	2/27/1997	ENGINEERING; TRANSPORTATION
McHenry Railroad Loop	Foster	McHenry	E side of ND 20	10/2/1986	COMMERCE; TRANSPORTATION
Blome, R. S., Granitoid Pavement in Grand Forks	Grand Forks	Grand Forks	Roughly, Lewis Blvd. S of Conklin Ave. and the area around jcts. of Walnut St. and 3rd Ave. and Minnesota Ave. and 5th St.	11/5/1991	COMMUNITY PLANNING AND DEVELOPMENT; ENGINEERING; TRANSPORTATION; INVENTION
Blome, R. S., Granitoid Pavement in Grand Forks (Boundary Decrease)	Grand Forks	Grand Forks	Lewis Blvd between Conklin and Fenton Ave, Lewis Blvd between Fenton Ave and Seward Ave; Woodland Ave between S 4th...	8/30/2010	COMMUNITY PLANNING AND DEVELOPMENT; ENGINEERING; TRANSPORTATION; INVENTION
Sorlie Memorial Bridge	Grand Forks	Grand Forks	E end of Demers Ave.	7/19/1999	TRANSPORTATION; ENGINEERING

Property Name	County	City	Street & Number	Listed Date	Area of Significance
Midway Bridge	Grand Forks	Johnstown	Across an unnamed creek, unnamed co. rd., approximately 1.5 mi. S and 2 mi. W of Johnstown	2/27/1997	ENGINEERING; TRANSPORTATION
Ost Valle Bridge	Grand Forks	Thompson	Across an unnamed tributary of the Red River, unnamed co. rd., approximately 6 mi. E and 1 mi. N of Thompson	2/27/1997	ENGINEERING; TRANSPORTATION
Romness Bridge	Griggs	Cooperstown	Across the Sheyenne River, unnamed co. rd., approximately 8 mi. N and 1 mi. E of Cooperstown	2/27/1997	ENGINEERING; TRANSPORTATION
Elliott Bridge	McHenry	Towner	Across the Souris River, unnamed co. rd., approximately 4 mi. N of Towner	2/27/1997	ENGINEERING; TRANSPORTATION
Lower Souris National Wildlife Refuge Airplane Hangar	McHenry	Upham	681 Salyer Rd	9/20/2011	CONSERVATION; ENGINEERING
Westgaard Bridge	McHenry	Voltaire	Across the Sheyenne River, unnamed co. rd., approximately 6 mi. N and 1 mi. E of Voltaire	2/27/1997	ENGINEERING; TRANSPORTATION
Fairview Lift Bridge	McKenzie	Cartwright	Over the Yellowstone River, abandoned railroad, approximately .75 mi. S of ND 200	3/14/1997	ENGINEERING; TRANSPORTATION
Knife River Bridge near Stanton	Mercer	Stanton	Cty. Rd., 4 mi. W and 1 mi. N of Stanton	4/25/2001	TRANSPORTATION; ENGINEERING

Property Name	County	City	Street & Number	Listed Date	Area of Significance
Great Northern Railway Underpass	Mountrail	Stanley	Burlington Northern Santa Fe Railway tracks, over ND 8, N end of Stanley	2/27/1997	ENGINEERING; TRANSPORTATION
Nesheim Bridge	Nelson	McVille	Across the Sheyenne River, unnamed co. rd., approximately 2 mi. SW of McVille	2/27/1997	TRANSPORTATION; ENGINEERING
Crystal Bridge	Pembina	Crystal	Appleton Ave., over Cart Cr.	5/30/1997	ENGINEERING; TRANSPORTATION
Colton's Crossing Bridge	Ransom	Lisbon	Across the Sheyenne River, unnamed co. rd., approximately 2 mi. S and 2 mi. E of Lisbon	2/27/1997	ENGINEERING; TRANSPORTATION
Lisbon Bridge	Ransom	Lisbon	Across the Sheyenne River, ND 32, N end of Lisbon	2/27/1997	ENGINEERING; TRANSPORTATION
Beaver Creek Bridge	Steele	Finley	Across Beaver Creek, unnamed co. rd., approximately 13 mi. E and 4 mi. N of Finley	2/27/1997	ENGINEERING; TRANSPORTATION
Midland Continental Overpass	Stutsman	Jamestown	Over abandoned railroad grade, former US 10, approximately 7 mi. E of Jamestown	2/27/1997	ENGINEERING; TRANSPORTATION
Caledonia Bridge	Traill	Caledonia	Across the Goose River, unnamed co. rd., approximately 1 mi. W of the Minnesota state line	2/27/1997	ENGINEERING; TRANSPORTATION
Norway Bridge	Traill	Mayville	Across the Goose River, unnamed co. rd., approximately 6 mi. E and 3 mi. S of Mayville	2/27/1997	ENGINEERING; TRANSPORTATION

Property Name	County	City	Street & Number	Listed Date	Area of Significance
Viking Bridge	Traill	Portland	Across the Goose River, unnamed co. rd., approximately 1 mi. NW of Portland	2/27/1997	ENGINEERING; TRANSPORTATION
Eastwood Park Bridge	Ward	Minot	Central Ave. and 6th St., SE	4/21/1975	ENGINEERING; TRANSPORTATION; SOCIAL HISTORY

Historic Objects

Property Name	County	City	Street & Number	Listed Date	Area of Significance
Amphitheater and Fieldstone WPA Features at Valley City Pioneer Park	Barnes	Valley City	SW of the intersection between 5th St and 8th Ave NW	2/1/2011	ARCHITECTURE; LANDSCAPE ARCHITECTURE; CONSERVATION
Fargo-Moorhead YMCA Sign	Cass	Fargo	400 1st Ave. South	3/17/2022	ART; SOCIAL HISTORY
WPA Stone Structures in Memorial Park and Calvary Cemetery	Grand Forks	Grand Forks	Se Corner from intersection of Gateway Dr and N Columbia Rd	7/6/2010	ARCHITECTURE; LANDSCAPE ARCHITECTURE
Crystal Springs Fountain	Kidder	Crystal Springs	1 mi NE from Crystal Springs on old US HWY 10	12/7/2010	ARCHITECTURE; LANDSCAPE ARCHITECTURE

Source: National Register of Historic Places, 2023

D.7 Buildings Insured by the State Tornado and Fire Fund

Description	Building Name	Address	City	Insured Amount
ND DEPT OF FACILITY MANAGEMENT	State Capitol	600 E Blvd Ave	Bismarck	$209,319,433
UNIVERSITY OF NORTH DAKOTA	School of Medicine & Health Sciences	237 1301 N Columbia Rd	Grand Forks	$133,802,754
NORTH DAKOTA STATE UNIVERSITY	Memorial Union/Lebedeff Hall/Life Cntr & Skywalk	1401 Administration Ave	Fargo	$93,824,368
ND DEPT OF FACILITY MANAGEMENT	Heritage Center	612 E Blvd Ave	Bismarck	$78,836,737
UNIVERSITY OF NORTH DAKOTA	Columbia Hall	501 N Columbia Dr	Grand Forks	$72,525,727
UNIVERSITY OF NORTH DAKOTA	Nistler College of Business & Public Admin	3125 University Ave	Grand Forks	$68,088,998
UNIVERSITY OF NORTH DAKOTA	Memorial Union	2901 University	Grand Forks	$78,459,371
UNIVERSITY OF NORTH DAKOTA	O'Kelly Hall	2951 2nd Ave N	Grand Forks	$58,721,790
ND STATE FAIR	State Fair Center	2005 Burdick Expressway E	Minot	$53,038,670
NORTH DAKOTA STATE UNIVERSITY	Sanford Health Athletic Complex	1300 17th Ave N	Fargo	$54,281,011
ND DEPT OF CORRECTIONS & REHABILITATION	Medical & Housing Facility	3100 East Railroad Ave	Bismarck	$49,881,681
WILLISTON STATE COLLEGE	Stevens Hall/Science/TW Leach	1410 University Ave	Williston	$50,947,579
UNIVERSITY OF NORTH DAKOTA	Steam Plant	3755 Campus Road	Grand Forks	$45,378,000
DICKINSON STATE UNIVERSITY	May Hall/Stoxen Library	291 Campus Dr	Dickinson	$54,307,605
ND STATE HOSPITAL	Lahaug Building/Gym/Walkway	2605 Circle Dr	Jamestown	$44,529,515
NORTH DAKOTA STATE UNIVERSITY	Sugihara Hall/Skywalk	1311 Albrecht Blvd N	Fargo	$51,920,994
ND VETERANS HOME	New Veteran's Home/Generator	1600 Veterans Dr	Lisbon	$44,088,696
MINOT STATE UNIVERSITY	Athletic Dome	500 University Ave W	Minot	$42,269,481
UNIVERSITY OF NORTH DAKOTA	Hyslop Sports Center	2751 2nd Ave N	Grand Forks	$42,352,474
ND STATE HOSPITAL	Power House/Smoke Stack/Equipment	2318 Circle Dr	Jamestown	$38,689,800
UNIVERSITY OF NORTH DAKOTA	EERC Conference & Library	15 N 23rd St (#172/175/188/190/227)	Grand Forks	$60,418,360
NORTH DAKOTA STATE UNIVERSITY	Minard Hall/Addition	1210 Albrecht Blvd	Fargo	$42,928,897
NORTH DAKOTA STATE UNIVERSITY	Wieble/Johnson/Dining Hall	1420 14th St N	Fargo	$41,017,152
MINOT STATE UNIVERSITY	Admin/Classrms/Student Union/Pool	500 University Ave W	Minot	$42,221,470
ADJUTANT GENERAL, CAMP GRAFTON	Regional Training Institute/Covered Entrance	4417 Hwy 20	Devils Lake	$36,953,022

Description	Building Name	Address	City	Insured Amount
NORTH DAKOTA STATE UNIVERSITY	A. G. Hill Center	1306 Centennial Blvd N	Fargo	$39,013,784
MINOT STATE UNIVERSITY	Old Main/Anna Nichole Nelson Hall	500 University Ave W	Minot	$39,055,519
NDSU AG EXPERIMENT RESEARCH	AES Research Greenhouse	1440 18th St	Fargo	$35,445,178
UNIVERSITY OF NORTH DAKOTA	McVey Hall	444 Stanford Road	Grand Forks	$36,057,378
NORTH DAKOTA STATE UNIVERSITY	Catherine Cater Hall	1650 15th Ave N	Fargo	$33,960,384
NORTH DAKOTA STATE UNIVERSITY	Quentin Burdick Bldg/Generator	1320 Albrecht Blvd	Fargo	$53,025,691
MINOT STATE UNIVERSITY	Olson Library	500 University Ave W	Minot	$45,745,856
NORTH DAKOTA STATE UNIVERSITY	Walster/Loftsgard & 1/2 of #34 Skywalk	1402 Albrecht Ave	Fargo	$42,021,604
BISMARCK STATE COLLEGE	Schafer Hall/SSSC/J Science Center	1500 Edwards Ave/1414 Schafer St	Bismarck	$42,429,363
NORTH DAKOTA STATE UNIVERSITY	Wellness Center	1707 Centennial Blvd	Fargo	$32,818,510
DOT HIGHWAY DEPARTMENT	Highway Dept Building	608 E Blvd Ave	Bismarck	$39,869,965
ND WORKFORCE SAFETY & INSURANCE	Workforce Safety Building	1600 E Century Ave	Bismarck	$37,790,879
ND STATE HOSPITAL	Gronewald/Middleton Building	2403 Circle Dr	Jamestown	$27,931,133
UNIVERSITY OF NORTH DAKOTA	Wellness Center	801 Princeton St	Grand Forks	$29,659,156
UNIVERSITY OF NORTH DAKOTA	Chester Fritz Library	3051 University Ave	Grand Forks	$68,307,931
MINOT STATE UNIVERSITY	Memorial Hall/Atrium	500 University Ave W	Minot	$31,501,717
UNIVERSITY OF NORTH DAKOTA	University Place Apartment Housing	3601 University Ave	Grand Forks	$27,340,659
NORTH DAKOTA STATE UNIVERSITY	Nodak Insurance Football Performance Complex	1380 16th Ave N	Fargo	$26,052,121
ND STATE COLLEGE OF SCIENCE	Heating Plant & Interior Equipment	1096 7th St N	Wahpeton	$26,377,764
UNIVERSITY OF NORTH DAKOTA	Harrington/Upson I & II/Generator	241 Centennial Dr (#247)	Grand Forks	$44,552,124
MAYVILLE STATE UNIVERSITY	Historic Main Auditorium	Third St NE	Mayville	$33,449,661
UNIVERSITY OF NORTH DAKOTA	Wilkerson Commons	3450 University Ave	Grand Forks	$30,249,576
UNIVERSITY OF NORTH DAKOTA	Thormodsgard Law Library/Law Bldg	215 Centennial Dr	Grand Forks	$35,186,644
NORTH DAKOTA STATE UNIVERSITY	Ladd Hall/Skywalk	1231 Albrecht Blvd	Fargo	$32,895,274
UNIVERSITY OF NORTH DAKOTA	Parking Ramp/Skywalk/Tower	2700 2nd Ave N	Grand Forks	$24,421,122
UNIVERSITY OF NORTH DAKOTA	Gillette/Education Hall	225 Centennial Dr	Grand Forks	$26,483,289

Description	Building Name	Address	City	Insured Amount
ND WATER COMMISSION	Water Treatment Plant/Generator*	735 W Broadway	Dickinson	$23,583,672
UNIVERSITY OF NORTH DAKOTA	Clifford Hall/Skywalk/Doppler Radar	2971 Campus Road	Grand Forks	$27,686,983
MAYVILLE STATE UNIVERSITY	HPER Complex	Stan Dakken Dr	Mayville	$23,739,150
NORTH DAKOTA STATE UNIVERSITY	Dolve Hall/Civil/Industrial Engineering	1319 Centennial Blvd	Fargo	$31,218,557
VALLEY CITY STATE UNIVERSITY	Center for the Arts	320 Viking Dr	Valley City	$24,864,778
UNIVERSITY OF NORTH DAKOTA	Fulton/Smith/Johnstone Halls/Skywalk	3301 University Ave	Grand Forks	$23,786,541
ND DEPT OF CORRECTIONS & REHABILITATION	Medical/Inmate Housing/Office	2521 Circle Drive	Jamestown	$23,329,561
ADJUTANT GENERAL, OFFICE OF THE	AFRC Armory	3920 31st St NW	Fargo	$22,318,000
UNIVERSITY OF NORTH DAKOTA	Merrifield Hall	276 Centennial Dr	Grand Forks	$26,051,707
NORTH DAKOTA STATE UNIVERSITY	Aldevron Tower	1455 14th Ave N	Fargo	$22,529,380
MINOT STATE UNIVERSITY	Swain Hall/Gymnasium	500 University Ave W	Minot	$23,323,189
UNIVERSITY OF NORTH DAKOTA	Chester Fritz Auditorium	3475 University Ave	Grand Forks	$23,302,780
ADJUTANT GENERAL, OFFICE OF THE	Readiness Center	3400 40th Ave N	Fargo	$21,898,709
VALLEY CITY STATE UNIVERSITY	McFarland Hall	101 College St SW	Valley City	$22,389,383
UNIVERSITY OF NORTH DAKOTA	Abbott Hall/Walkway	151 Cornell St	Grand Forks	$27,047,880
DICKINSON STATE UNIVERSITY	Badlands Activities Center	398 State Ave	Dickinson	$20,350,400
NORTH DAKOTA STATE UNIVERSITY	Library	1201 Albrecht Blvd	Fargo	$44,090,530
ND STATE HOSPITAL	New Horizons Building	2501 Circle Dr	Jamestown	$21,166,664
UNIVERSITY OF NORTH DAKOTA	Hughes Fine Arts Center	3350 Campus Road	Grand Forks	$26,340,332
ADJUTANT GENERAL, CAMP GRAFTON	Armory	4417 Hwy 20	Devils Lake	$19,693,299
ND STATE COLLEGE OF SCIENCE	Schultz/Walton/Forkner/Riley Hall	658 8th Ave N, 638 8th Ave N, 811 6th St. Oval, and 813 6th St. Oval	Wahpeton	$21,227,857
NORTH DAKOTA STATE UNIVERSITY	Ceres Hall	1301 Administration Ave	Fargo	$20,952,448
ND DEPT OF CORRECTIONS & REHABILITATION	Central Office/Walkway/W Tower	3100 Railroad Ave	Bismarck	$21,599,504
DICKINSON STATE UNIVERSITY	Murphy Hall Science Building/Auditorium	1003 5th St W	Dickinson	$19,871,172
ND STATE FAIR	Grandstand/Concession/Restrooms	2005 Burdick Expressway E	Minot	$18,684,614

Description	Building Name	Address	City	Insured Amount
UNIVERSITY OF NORTH DAKOTA	Starcher Hall	10 Cornell St	Grand Forks	$25,380,804
UNIVERSITY OF NORTH DAKOTA	Tech Accelerator	4201 James Ray Dr	Grand Forks	$20,920,838
VALLEY CITY STATE UNIVERSITY	Rhoades Science Center	140 College St SE	Valley City	$22,128,270
MINOT STATE UNIVERSITY	Hartnett Hall/Auditorium	500 University Ave W	Minot	$19,537,073
MINOT STATE UNIVERSITY	Moore Hall/Auditorium	500 University Ave W	Minot	$20,695,716
LIFE SKILLS & TRANSITION CENTER	Power House/Smokestack	701 West 6th St	Grafton	$18,243,215
UNIVERSITY OF NORTH DAKOTA	Ryan Hall/Skywalk	4251 University Ave	Grand Forks	$25,420,557
ADJUTANT GENERAL, OFFICE OF THE	RJB Armory/Generator	4200 E Miriam Ave	Bismarck	$17,820,292
ND STATE COLLEGE OF SCIENCE	Barnard Hall/Tech Center and Solar Panels	620 Merbach Dr. and 621 13th Ave. N	Wahpeton	$21,687,143
NORTH DAKOTA STATE UNIVERSITY	Morrill Hall & 1/2 of #79 Skywalk	1230 Albrecht Blvd	Fargo	$20,613,051
ND STATE COLLEGE OF SCIENCE	Bisek Hall	1320 7th St North	Wahpeton	$21,800,555
UNIVERSITY OF NORTH DAKOTA	Odegard/Streibel/Skybridge/Sphere	3950 Campus Road	Grand Forks	$20,064,391
ND STATE COLLEGE OF SCIENCE	Clair T. Blikre Activities Center	902 14th Ave. N	Wahpeton	$17,917,984
ADJUTANT GENERAL, OFFICE OF THE	Grand Forks Armory/Generator	1501 S 48th St	Grand Forks	$16,796,200
NORTH DAKOTA STATE UNIVERSITY	Music Education/Auditorium Seating	1511 12th Ave N	Fargo	$18,438,265
ADJUTANT GENERAL, OFFICE OF THE	AFRC Building	3420 2nd St NE	Minot	$16,275,163
UNIVERSITY OF NORTH DAKOTA	Facilities/Data Center/Generator	3791 Campus Road	Grand Forks	$27,436,735
WILLISTON STATE COLLEGE	Frontier Hall	1410 University Ave	Williston	$16,157,668
DICKINSON STATE UNIVERSITY	Scott Gym/Weinbergen Hall	1100 2nd St W	Dickinson	$16,225,039
UNIVERSITY OF NORTH DAKOTA	Gamble Hall	293 Centennial Dr	Grand Forks	$18,604,917
ND WATER COMMISSION	WT Plant & Interior Equipment	101 County Road 13	Zap	$15,389,831
BISMARCK STATE COLLEGE	Technical Center	1200 College Dr	Bismarck	$25,242,338
NORTH DAKOTA STATE UNIVERSITY	Bentson Bunker Fieldhouse	1301 Centennial Blvd	Fargo	$16,530,618
UNIVERSITY OF NORTH DAKOTA	Fredrick 'Fritz' D. Pollard Jr Athletic Center	2510 2nd Ave N	Grand Forks	$15,661,990
NORTH DAKOTA STATE UNIVERSITY	Seim Hall	1510 15th Ave N	Fargo	$15,499,125
UNIVERSITY OF NORTH DAKOTA	Hamline Square A, B & Walkway	1100 & -1150 Hamline	Grand Forks	$15,328,015

Description	Building Name	Address	City	Insured Amount
NORTH DAKOTA STATE UNIVERSITY	Sevrinson Hall	1422 Albrecht Blvd	Fargo	$15,416,556
NORTH DAKOTA STATE UNIVERSITY	Thompson Hall	1412 Albrecht Blvd	Fargo	$15,422,049
BANK OF NORTH DAKOTA	Financial Institution	1200 Memorial Hwy	Bismarck	$18,796,394
NORTH DAKOTA STATE UNIVERSITY	Pavek Hall	1420 Bolley Dr	Fargo	$15,456,786
NORTH DAKOTA STATE UNIVERSITY	Sudro Hall	1401 Albrecht Ave	Fargo	$21,356,330
DICKINSON STATE UNIVERSITY	Student Services/Auxiliary Operations	900 Campus Dr	Dickinson	$16,751,322
UNIVERSITY OF NORTH DAKOTA	McCannel Hall/Walkway	2891 2nd Ave N	Grand Forks	$17,165,841
UNIVERSITY OF NORTH DAKOTA	Hangars/Maint/Admin (1/2 Skywalk)	2788 Airport Dr (257,258,260-263,264)	Grand Forks	$18,215,371
NORTH DAKOTA STATE UNIVERSITY	Residence Hall Apartments	1435 18th St N	Fargo	$15,220,289
MAYVILLE STATE UNIVERSITY	Library/Science Center/Greenhouse	Fourth St NE	Mayville	$18,914,130
NORTH DAKOTA STATE UNIVERSITY	Waldron Hall & 1/2 of #48 Skywalk	1360 Bolley Dr	Fargo	$16,955,386
MINOT STATE UNIVERSITY	Student Wellness & Fitness Center	500 University Ave W	Minot	$14,668,360
NORTH DAKOTA STATE UNIVERSITY	Living Learning Center	1416 17th St N	Fargo	$14,489,487
NDSU AG EXPERIMENT RESEARCH	Veterinary Diagnostic Lab	4035 19th Ave N	Fargo	$14,383,606
MINERAL RESOURCES (G. S.), DEPT OF	C & S Library/Skywalk	Campus Road & Cornell St	Grand Forks	$15,040,385
ND STATE HOSPITAL	Learning Resource Center/Walkway	2509 Circle Dr	Jamestown	$14,063,235
MAYVILLE STATE UNIVERSITY	Agassiz Hall Dorm	Second Ave NE	Mayville	$14,226,186
BISMARCK STATE COLLEGE	Student Union	1425 Schafer St	Bismarck	$17,180,568
ND STATE COLLEGE OF SCIENCE	Old Main	602 Old Main Dr.	Wahpeton	$16,221,624
DICKINSON STATE UNIVERSITY	Klinefelter Auditorium/Classrooms/Office	233 Campus Dr	Dickinson	$14,063,446
ND VISION SERVICES	East Wing/West Wing/South Wing	500 Stanford Rd	Grand Forks	$14,219,124
LAKE REGION STATE COLLEGE	Academic Building	1801 College Dr N	Devils Lake	$15,668,497
NORTH DAKOTA STATE UNIVERSITY	West Dining Center	1500 15th Ave N	Fargo	$14,408,257
ND STATE COLLEGE OF SCIENCE	Trade Tech/Schuett Hall	1180 5th St N	Wahpeton	$17,753,836
NORTH DAKOTA STATE UNIVERSITY	Research & Technology I	1735 NDSU Research Park Dr	Fargo	$19,507,536
NORTH DAKOTA STATE UNIVERSITY	Animal Nutrition & Physiology Center	1805 15th Ave N	Fargo	$13,494,691

Description	Building Name	Address	City	Insured Amount
VALLEY CITY STATE UNIVERSITY	Heating Plant/Stacks	200 College St SE	Valley City	$12,082,088
NORTH DAKOTA STATE UNIVERSITY	Administration Building	1340 Administration Ave	Fargo	$12,996,061
MAYVILLE STATE UNIVERSITY	Campus Center with Indoor Pool	Fourth St NE	Mayville	$12,827,183
ADJUTANT GENERAL, OFFICE OF THE	Armory/Hangar/Generator	3410 Yegen Rd	Bismarck	$12,078,908
ND STATE COLLEGE OF SCIENCE	Hektner Student Center	800 6th St. Oval	Wahpeton	$15,298,431
UNIVERSITY OF NORTH DAKOTA	Biomedical Research/Generator	501 N Columbia Road	Grand Forks	$14,245,164
ND DEPT OF CORRECTIONS & REHABILITATION	Kitchen/Dining/Office/Classrooms	2521 Circle Drive	Jamestown	$11,977,616
NORTH DAKOTA STATE UNIVERSITY	H Plant/Chimney/Equip/Generator	1235 Bolley Dr	Fargo	$12,000,000
ND STATE COLLEGE OF SCIENCE	Nordgaard Hall Dormitory	1318 5th St. N	Wahpeton	$11,881,772
UNIVERSITY OF NORTH DAKOTA	Squires Hall	430 Princeton St	Grand Forks	$14,188,307
UNIVERSITY OF NORTH DAKOTA	Leonard Hall	81 Cornell St	Grand Forks	$15,356,418
ADJUTANT GENERAL, OFFICE OF THE	Readiness Center	3406 Yegen Rd	Bismarck	$11,592,225
WILLISTON STATE COLLEGE	Career & Technical Ed Building	1410 University Ave	Williston	$12,787,611
NORTH DAKOTA STATE UNIVERSITY	Apartment 1701	1701 University Dr N	Fargo	$11,625,975
BISMARCK STATE COLLEGE	LEA Hall	1400 Schafer St	Bismarck	$17,891,819
NORTH DAKOTA STATE UNIVERSITY	Nisakanen Apartment #1	1837 University Dr N	Fargo	$11,599,156
NORTH DAKOTA STATE UNIVERSITY	Nisakanen Apartment #2	1844 10 St N	Fargo	$11,597,124
NORTH DAKOTA STATE UNIVERSITY	Hultz Hall & Skywalks*	1300 Albrecht Blvd	Fargo	$18,594,282
NORTH DAKOTA STATE UNIVERSITY	Harris Hall/NCI	1250 Bolley Dr	Fargo	$20,138,615
DAKOTA COLLEGE AT BOTTINEAU	Thatcher Hall	105 Simrall Blvd	Bottineau	$13,529,441
UNIVERSITY OF NORTH DAKOTA	Walsh Hall	3251 5th Ave N	Grand Forks	$11,922,940
ND STATE COLLEGE OF SCIENCE	Robertson Hall Dormitory	1301 4th St N	Wahpeton	$11,268,015
NORTH DAKOTA STATE UNIVERSITY	Stevens Hall/Auditorium Seating	1330 Bolley Dr	Fargo	$16,532,171
DICKINSON STATE UNIVERSITY	Lowman Walton Hall	300 13th Ave W	Dickinson	$10,914,459
UNIVERSITY OF NORTH DAKOTA	Witmer Hall	101 Cornell St	Grand Forks	$13,605,816
NORTH DAKOTA STATE UNIVERSITY	Reed Hall	1431 Albrecht Ave	Fargo	$11,198,187

Description	Building Name	Address	City	Insured Amount
NORTH DAKOTA STATE UNIVERSITY	Bison Court East Residence Hall	1440 University Dr N	Fargo	$10,903,634
ADJUTANT GENERAL, OFFICE OF THE	AFR Center/Generator	2003 4th St N	Wahpeton	$10,606,839
NORTH DAKOTA STATE UNIVERSITY	Stockbridge Hall	1420 University Dr N	Fargo	$11,072,466
UNIVERSITY OF NORTH DAKOTA	Twamley Hall	264 Centennial Dr	Grand Forks	$13,226,380
NORTH DAKOTA STATE UNIVERSITY	South Engineering	1211 Albrecht Blvd	Fargo	$11,833,625
UNIVERSITY OF NORTH DAKOTA	University Health Facility	725 Hamline St	Grand Forks	$12,603,949
VALLEY CITY STATE UNIVERSITY	Vangstad Auditorium	125 College St SW	Valley City	$11,471,768
VALLEY CITY STATE UNIVERSITY	McCarthy Hall	620 2nd Ave SE	Valley City	$11,231,220
NORTH DAKOTA STATE UNIVERSITY	Churchill Hall	1300 Centennial Blvd	Fargo	$10,653,227
ND STATE COLLEGE OF SCIENCE	Horton Hall	550 Old Main Dr.	Wahpeton	$13,355,996
UNIVERSITY OF NORTH DAKOTA	College Of Nursing	430 Oxford St	Grand Forks	$13,124,029
UNIVERSITY OF NORTH DAKOTA	Swanson Hall	211 Cornell St	Grand Forks	$10,441,773
ND DEPT OF CORRECTIONS & REHABILITATION	West Unit/Corridor/AS	3100 Railroad Ave	Bismarck	$9,926,360
ND DEPT OF CORRECTIONS & REHABILITATION	Power Plant/Equipment/Office	3100 Railroad Ave	Bismarck	$10,370,881
MAYVILLE STATE UNIVERSITY	Powerhouse/Smokestack/Equipment	Third St NE	Mayville	$9,465,300
MAYVILLE STATE UNIVERSITY	Classroom Building/Auditorium	Campus Drive	Mayville	$10,065,698
ND HEALTH DEPARTMENT	Bismarck Lab & Addition	2635 East Main	Bismarck	$16,469,100
UNIVERSITY OF NORTH DAKOTA	Brannon Hall	446 Stanford Road	Grand Forks	$10,719,800
MINOT STATE UNIVERSITY	Power Plant/Stack/Maintenance	500 University Ave W	Minot	$9,295,640
UNIVERSITY OF NORTH DAKOTA	Selke Hall	448 Stanford Road	Grand Forks	$9,820,384
UNIVERSITY OF NORTH DAKOTA	Noren Hall	450 Stanford Road	Grand Forks	$9,830,434
VALLEY CITY STATE UNIVERSITY	Student Union	230 Viking Dr	Valley City	$9,585,816
MAYVILLE STATE UNIVERSITY	Central Heating Plant/Equipment	Third St NE	Mayville	$9,142,987
UNIVERSITY OF NORTH DAKOTA	National Hydrogen Technical Center	15 N 23rd St	Grand Forks	$18,724,160
ND WATER COMMISSION	Pump Station/Interior Equip/Generator	905 16th St SW	Minot	$8,809,714
JOB SERVICE NORTH DAKOTA	Office Building	1000 East Divide	Bismarck	$12,522,046

Description	Building Name	Address	City	Insured Amount
ND DEPT OF FACILITY MANAGEMENT	Liberty Memorial Building	604 E Blvd Ave	Bismarck	$8,685,139
ND WATER COMMISSION	Residual Handling Facility	719 West Broadway	Dickinson	$8,602,532
ND DEPT OF CORRECTIONS & REHABILITATION	North Unit	3100 Railroad Ave	Bismarck	$9,201,851
ND DEPT OF HUMAN SERVICES	SEHSC @ Fargo	2624 9th Ave SW	Fargo	$10,497,406
VALLEY CITY STATE UNIVERSITY	Kolstoe Hall	125 Viking Dr	Valley City	$8,553,600
MINOT STATE UNIVERSITY	Pioneer Hall	500 University Ave W	Minot	$9,199,321
DICKINSON STATE UNIVERSITY	Woods Hall Dormitory	841 5th St W	Dickinson	$8,577,762
NORTH DAKOTA STATE UNIVERSITY	Research I Addition	1715 NDSU Research Dr	Fargo	$26,147,286
VALLEY CITY STATE UNIVERSITY	Snoeyenbos Hall	731 4th Ave SW	Valley City	$8,740,941
ND STATE COLLEGE OF SCIENCE	Haverty Hall	610 Old Main Dr.	Wahpeton	$10,756,077
LIFE SKILLS & TRANSITION CENTER	Sunset Workshop/Classroom Bldg	701 West 6th St	Grafton	$8,788,179
BISMARCK STATE COLLEGE	Training Facility for Health and Science Programs	1133 College Drive	Bismarck	$9,313,000
MINOT STATE UNIVERSITY	Model Hall	500 University Ave W	Minot	$9,217,526
LIFE SKILLS & TRANSITION CENTER	Health Service Center	701 West 6th St	Grafton	$9,134,423
DICKINSON STATE UNIVERSITY	Delong Hall Dormitory	281 Delong Pl	Dickinson	$8,327,204
LAKE REGION STATE COLLEGE	Bergstrom Technical Center	1801 College Dr N	Devils Lake	$10,474,931
LIFE SKILLS & TRANSITION CENTER	Cedar Grove Dorm	701 West 6th St	Grafton	$8,495,806
LIFE SKILLS & TRANSITION CENTER	Maplewood Dorm	701 West 6th St	Grafton	$8,495,806
MINOT STATE UNIVERSITY	Lura Manor Dorm	500 University Ave W	Minot	$8,743,344
VALLEY CITY STATE UNIVERSITY	Osman Field House	730 8th Ave SW	Valley City	$8,440,737
UNIVERSITY OF NORTH DAKOTA	Information Technology Center	4349 James Ray Dr	Grand Forks	$8,135,332
ND STATE COLLEGE OF SCIENCE	Mayme Green Allied Health Center	450 Old Main Dr.	Wahpeton	$8,784,371
ADJUTANT GENERAL, OFFICE OF THE	Administration	030 Fraine Barracks Lane	Bismarck	$8,174,586
NORTH DAKOTA STATE UNIVERSITY	Burgum Hall	1333 12th Ave N	Fargo	$8,230,852
ND STATE COLLEGE OF SCIENCE	Harry Stern and Ella Stern Cultural Center	820 6th St. Oval	Wahpeton	$8,240,780
ADJUTANT GENERAL, OFFICE OF THE	Field Maintenance Shop FMS 6	2135 7th St SE	Valley City	$7,714,600
MINOT STATE UNIVERSITY	Cook Hall Dorm	500 University Ave W	Minot	$7,839,486

Description	Building Name	Address	City	Insured Amount
NORTH DAKOTA STATE UNIVERSITY	Van Es Hall/Auditorium Seating	1523 Centennial Blvd	Fargo	$9,903,359
ND DEPT OF CORRECTIONS & REHABILITATION	SAU/Offices/Gym	2521 Circle Drive	Jamestown	$7,960,721
VALLEY CITY STATE UNIVERSITY	Allen Memorial Library	137 College St SW	Valley City	$17,357,207
UNIVERSITY OF NORTH DAKOTA	Skalicky Tech Incubator Center	4300 Darmounth Dr	Grand Forks	$8,319,005
ND HISTORICAL SOCIETY	Lewis & Clark Interpretive Center	Hwy 83 N	Washburn	$7,892,368
ND SCHOOL FOR THE DEAF	A. R. Spear/Gym/Resource Center	1401 College Dr N	Devils Lake	$7,753,417
NORTH DAKOTA STATE UNIVERSITY	Nisakanen Apartment #3	1762 10 St N	Fargo	$7,401,189
ND WATER COMMISSION	Dodge Pump Station	NE4 Sec 16-144-91	Dodge	$7,128,689
ADJUTANT GENERAL, OFFICE OF THE	Field Maintenance Shop #1	3420 2nd St NE	Minot	$6,957,299
ND WATER COMMISSION	Beulah Intake Pump Station/Telemetry	SE4 Sec 14-146-88	Beulah	$6,887,000
WILLISTON STATE COLLEGE	Workforce Training Center @ TrainND Northwest	415 22nd Ave NE	Williston	$6,882,469
NORTH DAKOTA STATE UNIVERSITY	Equine Science Center	5140 19th Ave N	Fargo	$7,688,588
ND DEPT OF CORRECTIONS & REHABILITATION	Education/Administration	701 16th Ave SW	Mandan	$8,964,512
MINOT STATE UNIVERSITY	Crane Hall Dorm	500 University Ave W	Minot	$7,233,322
ND DEPT OF CORRECTIONS & REHABILITATION	Admin Office/Training/Visiting/Storage	2521 Circle Drive	Jamestown	$6,968,816
BISMARCK STATE COLLEGE	Lidstrom Hall	1330 Edwards Ave	Bismarck	$6,877,348
ATTORNEY GENERAL, OFFICE OF THE	Crime Lab Building*	2641 E Main Ave	Bismarck	$11,897,500
ND SCHOOL FOR THE DEAF	C. F. Smith/Food Services/Elevator	1401 College Dr N	Devils Lake	$7,342,437
ND STATE COLLEGE OF SCIENCE	Mildred Johnson Library	512 Merbach Dr.	Wahpeton	$9,000,730
ND DEPT OF FACILITY MANAGEMENT	State Office Building	900 E Blvd Ave	Bismarck	$6,499,702
DICKINSON STATE UNIVERSITY	Ag Building	400 State Ave	Dickinson	$7,118,993
ND WATER COMMISSION	Finished Water Pump Station	811 W Broadway, Building A	Dickinson	$6,410,573
NORTH DAKOTA STATE UNIVERSITY	Dinan Hall	1337 Administration Ave	Fargo	$6,672,464
DAKOTA COLLEGE AT BOTTINEAU	Gross Hall/Knudson Student Union	105 Simrall Blvd	Bottineau	$6,431,530
ND STATE HOSPITAL	Pettigrew Building	2318 Circle Dr	Jamestown	$6,284,527
DOT MTCE & ENG SERVICES/FARGO	Fargo District Office/Shop Building	503 38th St S	Fargo	$8,235,818

Description	Building Name	Address	City	Insured Amount
UNIVERSITY OF NORTH DAKOTA	72-Plex W Green #5	3904 University Ave	Grand Forks	$6,354,142
UNIVERSITY OF NORTH DAKOTA	UND Book Store	775 Hamline St	Grand Forks	$6,099,093
MINOT STATE UNIVERSITY	Dakota Hall	500 University Ave W	Minot	$6,181,104
BISMARCK STATE COLLEGE	Werner Hall	1600 Edwards Ave	Bismarck	$6,192,483
BISMARCK STATE COLLEGE	Armory	1601 Edwards Ave	Bismarck	$8,678,668
NORTH DAKOTA STATE UNIVERSITY	Agricultural Engineering	1221 Albrecht Blvd	Fargo	$6,673,821
NORTH DAKOTA STATE UNIVERSITY	Bison Court West	1415 14th St N	Fargo	$5,966,614
UNIVERSITY OF NORTH DAKOTA	Neuroscience Research Center	504 Hamline St	Grand Forks	$12,661,029
UNIVERSITY OF NORTH DAKOTA	Landing Zone w/Walkways	3480 University Ave	Grand Forks	$5,753,991
LAKE REGION STATE COLLEGE	Student Union	1801 College Dr N	Devils Lake	$6,697,821
MINOT STATE UNIVERSITY	McCulloch Hall Dorm	500 University Ave W	Minot	$5,754,159
ND GAME AND FISH	Game & Fish Office Building	100 N Bismarck Expy	Bismarck	$6,877,025
UNIVERSITY OF NORTH DAKOTA	Flight/Office/Hangars (1/2 Skywalk)	2806 Airport Dr (256)	Grand Forks	$6,193,055
LIFE SKILLS & TRANSITION CENTER	Prairie View Office Building	701 West 6th St	Grafton	$5,674,208
ND DEPT OF CORRECTIONS & REHABILITATION	Inmate Recreation	3100 Railroad Ave	Bismarck	$5,951,407
UNIVERSITY OF NORTH DAKOTA	Children's Center/Housing Office	525 Stanford Road	Grand Forks	$6,680,211
ND STATE COLLEGE OF SCIENCE	Satterlee Hall Dormitory	801 4th St N	Wahpeton	$5,661,843
UNIVERSITY OF NORTH DAKOTA	Northern Plains Behavioral Research	400 Oxford St	Grand Forks	$6,592,900
ADJUTANT GENERAL, OFFICE OF THE	WMD-CST Building/Generator	400 Fraine Barracks Loop	Bismarck	$5,537,389
VALLEY CITY STATE UNIVERSITY	McCoy Hall	355 Viking Dr SW	Valley City	$5,462,912
ND DEPT OF CORRECTIONS & REHABILITATION	Food Service/Dining/Storage	3100 Railroad Ave	Bismarck	$6,799,187
ND WATER COMMISSION	Richardton Pump Station	SW4 SW4 Sec 29-140-92	Richardton	$5,423,700
ADJUTANT GENERAL, OFFICE OF THE	Field Maintenance Shop #3	1511 S 48th St	Grand Forks	$5,416,800
MAYVILLE STATE UNIVERSITY	Birkelo Hall Dorm/Day Care	Stan Dakken Dr	Mayville	$5,724,520
ADJUTANT GENERAL, CAMP GRAFTON	Heating Plant	4417 Hwy 20	Devils Lake	$5,414,450
LIFE SKILLS & TRANSITION CENTER	Professional Office Building	701 West 6th St	Grafton	$6,761,125

Description	Building Name	Address	City	Insured Amount
ND STATE COLLEGE OF SCIENCE	College Complex NW Dorm/Day Care	1509 Center Drive	Wahpeton	$5,421,326
ND STATE COLLEGE OF SCIENCE	College Complex SE Dormitory	1438 Center Drive	Wahpeton	$5,417,618
ND STATE COLLEGE OF SCIENCE	McMahon Hall Dormitory	806 5th St N	Wahpeton	$5,435,742
UNIVERSITY OF NORTH DAKOTA	Medical Education	1919 Elm St	Fargo	$5,981,492
ND HIGHWAY PATROL	Law Enforcement Training Center	1320 Schafer St	Bismarck	$6,191,563
ND STATE COLLEGE OF SCIENCE	Babcock Hall Dormitory	812 5th St N	Wahpeton	$5,354,373
NORTH DAKOTA STATE UNIVERSITY	Askanse Hall	1200 Albrecht Ave	Fargo	$6,910,594
ND DEPT OF CORRECTIONS & REHABILITATION	South Unit	3100 Railroad Ave	Bismarck	$5,429,950
LIFE SKILLS & TRANSITION CENTER	Food Service Center	701 West 6th St	Grafton	$5,768,785
NORTH DAKOTA STATE UNIVERSITY	Shepperd Arena/Auditorium Seating	1350 Albrecht Blvd	Fargo	$5,721,266
DICKINSON STATE UNIVERSITY	Selke Hall Dormitory	950 Campus Dr	Dickinson	$5,244,160
ND DEPT OF CORRECTIONS & REHABILITATION	Gym/Pool Complex	701 16th Ave SW	Mandan	$5,255,765
LIFE SKILLS & TRANSITION CENTER	New Horizons Residential Center	701 West 6th St	Grafton	$5,306,195
VALLEY CITY STATE UNIVERSITY	Graichen Gym	143 College St SW	Valley City	$5,391,280
LIFE SKILLS & TRANSITION CENTER	Collette Auditorium	701 West 6th St	Grafton	$5,134,202
NORTH DAKOTA STATE UNIVERSITY	Niskanen 30-Plex Apartment	1745 University Dr N	Fargo	$5,295,667
MAYVILLE STATE UNIVERSITY	Berg Hall Dorm	Stan Dakken Dr	Mayville	$5,035,659
DOT MTCE & ENG SERVICES/DICKINSON	Dickinson Office/Shop	1700 3rd Ave W Ste 101	Dickinson	$6,469,117
ADJUTANT GENERAL, OFFICE OF THE	Equipment Storage Building	3400 40th Ave N	Fargo	$4,852,002
ADJUTANT GENERAL, CAMP GRAFTON	Vehicle Storage	4417 Hwy 20	Devils Lake	$4,840,500
ND DEPT OF CORRECTIONS & REHABILITATION	Bldg A/Sign/Tag/Metal/N Tower/N Gate	3303 East Main	Bismarck	$7,852,100
WILLISTON STATE COLLEGE	Crighton Building	1410 University Ave	Williston	$5,960,702
DICKINSON STATE UNIVERSITY	Stickney Hall Faculty Office Bldg	978 Campus Dr	Dickinson	$5,262,294
VALLEY CITY STATE UNIVERSITY	Mythaler Hall	205 Viking Dr	Valley City	$4,744,350
NORTH DAKOTA STATE UNIVERSITY	Electric Engineering	1411 Centennial Blvd	Fargo	$7,671,407
ND STATE COLLEGE OF SCIENCE	Ballweber Hall	453 Old main Dr.	Wahpeton	$5,616,875

Description	Building Name	Address	City	Insured Amount
ND DEPT OF CORRECTIONS & REHABILITATION	Programs/Training	3100 Railroad Ave	Bismarck	$5,319,646
NORTH DAKOTA STATE UNIVERSITY	Central Storage Facility	1880 Centennial Blvd	Fargo	$4,825,162
DOT MTCE & ENG SERVICES/BISMARCK	Bismarck Testing Lab	300 Airport Road	Bismarck	$7,768,191
ND STATE SEED DEPARTMENT	Seed Research Lab (Johansen Hall)	1313 18th St. North	Fargo	$5,446,511
UNIVERSITY OF NORTH DAKOTA	Armory	255 Centennial Dr	Grand Forks	$4,687,700
NORTH DAKOTA STATE UNIVERSITY	Track & Field Practice/Event Center	1625 14th St N	Fargo	$4,783,659
NORTH DAKOTA STATE UNIVERSITY	North Stands Stadium	1300 17th Ave N	Fargo	$4,601,994
ADJUTANT GENERAL, OFFICE OF THE	Field Maintenance Shop #2	3917 31st St NW	Fargo	$4,352,477
ADJUTANT GENERAL, OFFICE OF THE	Emergency Operations Center	035 Fraine Barracks Lane	Bismarck	$4,325,200
ND DEPT OF CORRECTIONS & REHABILITATION	Central Receiving & Distribution	2517 Circle Dr	Jamestown	$5,302,664
UNIVERSITY OF NORTH DAKOTA	Material Recycling/Trans/Grounds Bldg	3925 Campus Road	Grand Forks	$5,974,329
UNIVERSITY OF NORTH DAKOTA	Generator Bldg with Generators	1301 N Columbia Rd	Grand Forks	$4,192,905
ADJUTANT GENERAL, OFFICE OF THE	Field Maintenance Shop #4	4300 E Miriam Ave	Bismarck	$4,191,300
DAKOTA COLLEGE AT BOTTINEAU	Mead Hall	105 Simrall Blvd	Bottineau	$4,393,976
UNIVERSITY OF NORTH DAKOTA	Burtness Theatre	281 Centennial Dr	Grand Forks	$4,671,573
VALLEY CITY STATE UNIVERSITY	Robertson Hall	201 Viking Dr	Valley City	$4,110,678
ADJUTANT GENERAL, CAMP GRAFTON	Vehicle Maintenance	4417 Hwy 20	Devils Lake	$4,077,300
BISMARCK COMMUNITY BOWL	Spectator Facility	1701 Canary Ave	Bismarck	$4,084,618
ND STATE HOSPITAL	All Faiths Church/Walkways	2317 Circle Dr	Jamestown	$4,077,344
DOT MTCE & ENG SERVICES/VALLEY CITY	Valley City Office/Shop	1524 8 Ave SW	Valley City	$5,466,440
DOT MTCE & ENG SERVICES/BISMARCK	Bismarck Section Building	218 Airport Rd	Bismarck	$3,900,350
ND DEPT OF CORRECTIONS & REHABILITATION	Pine Cottage Men's Dorm	701 16th Ave SW	Mandan	$4,009,751
ND STATE COLLEGE OF SCIENCE	Patterson Maintenance/Hydraulic Lifts	1245 7th St. N	Wahpeton	$5,438,896
MINOT STATE UNIVERSITY	Press Box	500 University Ave W	Minot	$3,743,945
ADJUTANT GENERAL, OFFICE OF THE	Readiness Center Annex	4150 E Miriam Ave	Bismarck	$3,795,200

Description	Building Name	Address	City	Insured Amount
JOB SERVICE NORTH DAKOTA	Office Building	1501 28th Ave South	Grand Forks	$3,916,520
ADJUTANT GENERAL, OFFICE OF THE	Unit Storage	4400 E Miriam Ave	Bismarck	$3,630,300
VALLEY CITY STATE UNIVERSITY	Foss Hall	200 College St SW	Valley City	$4,155,948
ND DEPT OF CORRECTIONS & REHABILITATION	Dormitory/Office/Visiting/Laundry	1800 48th Ave SW	Bismarck	$3,983,800
ND HISTORICAL SOCIETY	Tourist/Museum Center	806 Hwy 59	Pembina	$3,742,227
DICKINSON STATE UNIVERSITY	Heating Plant/Smoke Stack/Equip	1096 2nd St W	Dickinson	$3,669,235
ND DEPT OF FACILITY MANAGEMENT	New Governor's Residence/Generator	1131 4th St	Bismarck	$3,918,799
DOT MTCE & ENG SERVICES/WILLISTON	Williston Shop	605 Dakota Parkway West	Williston	$3,631,066
ND HIGHWAY PATROL	Indoor Shooting Range	2300 66th St NE	Bismarck	$3,713,932
NORTH DAKOTA STATE UNIVERSITY	Ehly Hall	1313 Centennial Blvd	Fargo	$5,103,465
BISMARCK STATE COLLEGE	Swensen Hall	1411 Schafer St	Bismarck	$3,930,449
ND GAME AND FISH	Garrison Dam Hatchery	530 Hatchery Road	Riverdale	$4,292,991
UNIVERSITY OF NORTH DAKOTA	Carnegie Home Economics	250 Centennial Dr	Grand Forks	$3,488,318
DOT MTCE & ENG SERVICES/BISMARCK	Bismarck Shop Building	214 Airport Road	Bismarck	$4,279,839
ND HISTORICAL SOCIETY	Interpretive Center/Museum	15349 39th Lane NW	Williston	$3,463,500
DOT MTCE & ENG SERVICES/GRAND FORKS	Grand Forks Office/Shop	1951 N Washington	Grand Forks	$4,998,640
ND DEPT OF CORRECTIONS & REHABILITATION	Hickory Cottage Men's Dorm	701 16th Ave SW	Mandan	$3,759,027
ADJUTANT GENERAL, CAMP GRAFTON	Paint Facility Building	4417 Hwy 20	Devils Lake	$3,395,600
ADJUTANT GENERAL, OFFICE OF THE	Unheated Equipment Vehicle Storage	3420 2nd St NE	Minot	$3,386,200
ND HISTORICAL SOCIETY	Courthouse	3rd Ave SE & 15th St	Jamestown	$3,375,000
LAKE REGION STATE COLLEGE	Gilliland Hall	1801 College Dr N	Devils Lake	$3,559,032
ND STATE COLLEGE OF SCIENCE	Mechanical Systems Tech	1150 7th St North	Wahpeton	$3,745,597
NORTH DAKOTA STATE UNIVERSITY	Putnam Hall	1349 12th Ave NW	Fargo	$3,506,779
ND WATER COMMISSION	Ray Christensen Pump Station & Telemetry Pole	143 South States Ave	Dickinson	$3,169,000
NORTH DAKOTA STATE UNIVERSITY	Thorson Maintenance Center	1310 Bolley Dr	Fargo	$3,922,644
WILLISTON STATE COLLEGE	Art Wood Building	1410 University Ave	Williston	$4,113,503
WILLISTON RESEARCH CENTER	Ernie French Center	14120 Hwy 2	Williston	$3,175,544

Description	Building Name	Address	City	Insured Amount
NORTH DAKOTA STATE UNIVERSITY	Engineering Building	1315 Centennial Blvd	Fargo	$4,070,701
NORTH DAKOTA STATE UNIVERSITY	North Greenhouse	1221 16th St N	Fargo	$3,634,482
ND PARKS AND RECREATION DEPARTMENT	Interpretive Center	2090-043 13571 Hwy 5	Cavalier	$3,058,096
ADJUTANT GENERAL, OFFICE OF THE	C-12 Hangar @ Bismarck	3420 Yegen Rd	Bismarck	$2,938,744
JOB SERVICE NORTH DAKOTA	Job Service Office Building	1601 East Century Ave	Bismarck	$3,056,796
LIFE SKILLS & TRANSITION CENTER	Warehouse/Shop	701 West 6th St	Grafton	$2,865,848
MINOT STATE UNIVERSITY	Campus Heights Student Housing	500 University Ave W	Minot	$2,876,714
DAKOTA COLLEGE AT BOTTINEAU	Milligan Hall	105 Simrall Blvd	Bottineau	$2,919,776
ND DEPT OF CORRECTIONS & REHABILITATION	Treatment Unit	3100 Railroad Ave	Bismarck	$3,085,865
LAKE REGION STATE COLLEGE	Library	1801 College Dr N	Devils Lake	$3,730,488
LIFE SKILLS & TRANSITION CENTER	Maintenance/Carpenter Shop	701 West 6th St	Grafton	$3,160,582
LIFE SKILLS & TRANSITION CENTER	Laundry Building	701 West 6th St	Grafton	$3,205,557
DAKOTA COLLEGE AT BOTTINEAU	Nelson Science Center	105 Simrall Blvd	Bottineau	$2,962,086
ND SCHOOL FOR THE DEAF	Trades Building	1401 College Dr N	Devils Lake	$2,782,566
LIFE SKILLS & TRANSITION CENTER	PT/OT/Pool Building	701 West 6th St	Grafton	$2,853,504
BISMARCK STATE COLLEGE	Mechanical Maintenance Instruction Facility	1831 Twin City Dr SE	Mandan	$2,651,100
NORTH DAKOTA STATE UNIVERSITY	South Greenhouse	1221 16th St N	Fargo	$2,832,325
UNIVERSITY OF NORTH DAKOTA	Museum Of Art	261 Centennial Dr	Grand Forks	$2,635,660
UNIVERSITY OF NORTH DAKOTA	24-Plex W Green #11	550 Carleton Court	Grand Forks	$2,651,865
UNIVERSITY OF NORTH DAKOTA	24-Plex W Green #12	110 State St	Grand Forks	$2,652,447
UNIVERSITY OF NORTH DAKOTA	24-Plex W Green #12	3605 Manitoba	Grand Forks	$2,652,412
UNIVERSITY OF NORTH DAKOTA	24-Plex W Green #12	3600 Campus Road	Grand Forks	$2,651,949
ND DEPT OF CORRECTIONS & REHABILITATION	Laundry/Storage	2521 Circle Drive	Jamestown	$2,743,565
LIFE SKILLS & TRANSITION CENTER	Midway Building	701 West 6th St	Grafton	$2,613,933
UNIVERSITY OF NORTH DAKOTA	EERC Lorne McEwen Tech Fac II- Bldg X	15 N 23rd St	Grand Forks	$18,823,905

Description	Building Name	Address	City	Insured Amount
DICKINSON RESEARCH CENTER	DREC Headquarters Building	1041 State Ave	Dickinson	$2,869,415
ND DEPT OF CORRECTIONS & REHABILITATION	Traffic/Offices/Laundry/Shower/Corridor	3100 Railroad Ave	Bismarck	$2,841,242
ND DEPT OF CORRECTIONS & REHABILITATION	Recreation Center	2521 Circle Drive	Jamestown	$2,659,212
UNIVERSITY OF NORTH DAKOTA	36-Plex W Green #10	3711-3719 University Ave	Grand Forks	$2,615,084
ADJUTANT GENERAL, OFFICE OF THE	Administration	050 Fraine Barracks Lane	Bismarck	$2,613,722
NORTH CENTRAL RESEARCH CENTER	Agronomy Lab & Greenhouse	5400 Hwy 83 South	Minot	$3,076,112
ND STATE HOSPITAL	Electrical Distribution Bldg/Equipment/Exterior Switch Gears	2708 Circle Dr	Jamestown	$2,545,900
ND HISTORICAL SOCIETY	Interpretive Center/Museum	3448 Chateau Road	Medora	$2,604,528
NORTH DAKOTA STATE UNIVERSITY	University Police & Safety	1523 12th Ave N	Fargo	$3,806,600
DOT MTCE & ENG SERVICES/MINOT	Minot Shop/Office	1305 Hwy 2 Bypass E	Minot	$4,119,840
JOB SERVICE NORTH DAKOTA	Office Building	1350 32nd St S	Fargo	$2,704,674
NDSU AG EXPERIMENT RESEARCH	Feed Mill/Equipment/Hopper Bins	19th Ave North	Fargo	$2,513,600
LAKE REGION STATE COLLEGE	Hofstad Ag Center	1801 College Dr N	Devils Lake	$3,317,687
UNIVERSITY OF NORTH DAKOTA	24-Plex W Green #11	580 Carlton Court	Grand Forks	$2,500,695
LIFE SKILLS & TRANSITION CENTER	All Faiths Chapel	701 West 6th St	Grafton	$2,530,486
UNIVERSITY OF NORTH DAKOTA	36-Plex W Green #10	205-209 State St	Grand Forks	$2,603,537
CARRINGTON RESEARCH CENTER	CREC Headquarters	663 Hwy 281 NE	Carrington	$2,744,200
ND DEPT OF CORRECTIONS & REHABILITATION	Centennial Hall Food Service Building	701 16th Ave SW	Mandan	$3,167,324
ND HISTORICAL SOCIETY	Chateau De Mores	3448 Chateau Road	Medora	$2,400,000
NDSU AG EXPERIMENT RESEARCH	Dairy Barn/2-Silos/A.D. Building #1	19th Ave North	Fargo	$2,579,184
DOT MTCE & ENG SERVICES/WILLISTON	Williston Office/Shop	605 Dakota Parkway W	Williston	$3,425,059
NDSU AG EXPERIMENT RESEARCH	Beef Research Barn	3616 19th Ave N	Fargo	$2,371,863
ND HISTORICAL SOCIETY	Little Theatre & Admin Offices	Cavalry Square	Ft. Totten	$2,331,000
NORTH DAKOTA STATE UNIVERSITY	Hastings Hall	1320 Bolley Dr	Fargo	$2,948,530

Description	Building Name	Address	City	Insured Amount
DOT MTCE & ENG SERVICES/DEVILS LAKE	Devils Lake Repair Shop	316 6th St SE	Devils Lake	$2,307,700
NORTH CENTRAL RESEARCH CENTER	Headquarters Building	5400 Hwy 83 South	Minot	$2,625,286
JOB SERVICE NORTH DAKOTA	Office Building	3400 N Broadway	Minot	$2,422,572
ND WATER COMMISSION	Jung Lake Pump Station/Telemetry/Generator	SE4 Sec 16-138-97	New England	$2,208,400
ND DEPT OF CORRECTIONS & REHABILITATION	Tompkins Building	2404 Circle Drive	Jamestown	$2,204,604
UNIVERSITY OF NORTH DAKOTA	Gershman Graduate Center	3233 University Ave	Grand Forks	$2,427,850
ND DEPT OF CORRECTIONS & REHABILITATION	Central Receiving & Warehouse	3301 E Main Ave	Bismarck	$3,149,259
CARRINGTON RESEARCH CENTER	Agronomy Lab	663 Hwy 281 NE	Carrington	$2,438,400
ND GAME AND FISH	Shop/Office Building	3001 East Main St	Bismarck	$2,427,117
ND SCHOOL FOR THE DEAF	Pool Building & Mechanical Equipment	1401 College Dr N	Devils Lake	$2,173,584
ND SCHOOL FOR THE DEAF	Blackhurst Dorm	1401 College Dr N	Devils Lake	$2,244,091
UNIVERSITY OF NORTH DAKOTA	24-Plex W Green #9	560 Carleton Court	Grand Forks	$2,161,721
ND DEPT OF CORRECTIONS & REHABILITATION	Tompkins Building	2404 Circle Drive	Jamestown	$2,137,138
ND DEPT OF TRUST LANDS	Office Building	1707 North 9th St	Bismarck	$2,629,600
ADJUTANT GENERAL, CAMP GRAFTON	Commissary/Fire Dept/Shop	4417 Hwy 20	Devils Lake	$2,146,118
ND HISTORICAL SOCIETY	Former Governor Mansion	320 E Ave B	Bismarck	$2,100,000
ND STATE FAIR	Livestock Expo Barn	2005 Burdick Expressway E	Minot	$2,100,395
NORTH DAKOTA STATE UNIVERSITY	Service Center Building	1401 16 1/2 St N	Fargo	$3,932,755
UNIVERSITY OF NORTH DAKOTA	Central Foods	3625 Campus Road	Grand Forks	$3,776,333
DOT MTCE & ENG SERVICES/VALLEY CITY	Valley City Section Building	1524 8th Ave SW	Valley City	$2,144,980
UNIVERSITY OF NORTH DAKOTA	24-Plex W Green #9	540 Carlton Court	Grand Forks	$2,068,121
UNIVERSITY OF NORTH DAKOTA	24-Plex W Green #9	570 Carlton Court	Grand Forks	$2,064,821
UNIVERSITY OF NORTH DAKOTA	Virginia Rose Apartments	3725 University Ave	Grand Forks	$2,026,965
ND DEPT OF FACILITY MANAGEMENT	Maintenance Shop	600 E Blvd Ave	Bismarck	$2,223,137
ND DEPT OF CORRECTIONS & REHABILITATION	Power Plant/Equipment/Generator	701 16th Ave SW	Mandan	$2,232,268

Description	Building Name	Address	City	Insured Amount
ADJUTANT GENERAL, CAMP GRAFTON	Barracks	4417 Hwy 20	Devils Lake	$1,942,700
ADJUTANT GENERAL, CAMP GRAFTON	Barracks	4417 Hwy 20	Devils Lake	$1,942,700
DOT MTCE & ENG SERVICES/REST AREAS	Beach Visitor Center	1255 1st Ave NW	Beach	$1,914,000
ADJUTANT GENERAL, CAMP GRAFTON	Barracks	4417 Hwy 20	Devils Lake	$1,894,300
ADJUTANT GENERAL, CAMP GRAFTON	Barracks	4417 Hwy 20	Devils Lake	$1,872,900
ADJUTANT GENERAL, CAMP GRAFTON	Barracks	4417 Hwy 20	Devils Lake	$1,872,900
ADJUTANT GENERAL, CAMP GRAFTON	Dining Hall	4417 Hwy 20	Devils Lake	$1,848,637
MINOT STATE UNIVERSITY	Facilities Department	500 University Ave W	Minot	$2,036,960
ADJUTANT GENERAL, OFFICE OF THE	Field Maintenance Shop #5	1501 Hwy 281 N	Jamestown	$1,786,500
MAYVILLE STATE UNIVERSITY	Larson Alumni Center	330 3rd St NE	Mayville	$1,851,862
ND GAME AND FISH	Biologist/Veterinarian Lab/Office	3001 East Main	Bismarck	$1,800,520
ND STATE FAIR	Commercial Building II	2005 Burdick Expressway E	Minot	$1,997,943
ND HISTORICAL SOCIETY	Interpretive Center/Museum	571 113 1/2 Ave NE	Cooperstown	$1,775,000
ND STATE HOSPITAL	Indoor Swimming Pool	2415 Circle Dr	Jamestown	$1,794,640
NDSU AG EXPERIMENT RESEARCH	Ag Service Center	1955 15th Ave N	Fargo	$2,107,903
ND DEPT OF CORRECTIONS & REHABILITATION	Education Building/Library	3100 Railroad Ave	Bismarck	$2,400,029
ADJUTANT GENERAL, OFFICE OF THE	Unheated Vehicle Storage	2135 7th St SE	Valley City	$1,713,500
LAKE REGION STATE COLLEGE	North Housing	1801 College Dr N	Devils Lake	$1,816,479
LANGDON RESEARCH CENTER	Vic Sturlaugson Research Center	9280 107th Ave NE	Langdon	$2,046,048
ADJUTANT GENERAL, OFFICE OF THE	USPFO Building	4100 E Miriam Ave	Bismarck	$1,678,900
ND DEPT OF CORRECTIONS & REHABILITATION	Kit/Dining/Treatment/Laundry/Maint	1800 48th Ave SW	Bismarck	$2,079,976
ADJUTANT GENERAL, OFFICE OF THE	Equipment/HazMat Storage	1531 S 48th St	Grand Forks	$1,644,700
BISMARCK COMMUNITY BOWL	Locker Room Structure	1701 Canary Ave	Bismarck	$1,749,457
UNIVERSITY OF NORTH DAKOTA	EERC Environmental Control Lab	15 N 23rd St	Grand Forks	$2,126,130
NORTH DAKOTA STATE UNIVERSITY	Engineering Administration Building	1401 Centennial Blvd	Fargo	$2,022,982
NORTH DAKOTA STATE UNIVERSITY	Robinson Hall	1601 Centennial Blvd	Fargo	$2,070,172

Description	Building Name	Address	City	Insured Amount
ND GAME AND FISH	Office/Shop	3320 East Lakeside Road	Jamestown	$1,858,610
NORTH DAKOTA STATE UNIVERSITY	U.V. Townhouse #131-147	1745 University Dr N	Fargo	$1,588,278
NORTH DAKOTA STATE UNIVERSITY	U.V. Townhouse #234-250	1745 University Dr N	Fargo	$1,607,175
UNIVERSITY OF NORTH DAKOTA	Conference Center	2724 University Ave	Grand Forks	$1,651,487
ND HISTORICAL SOCIETY	Historic Trail Inn	Cavalry Square	Ft. Totten	$1,556,400
NORTH DAKOTA STATE UNIVERSITY	U.V. Townhouse #105-116	1745 University Dr N	Fargo	$1,564,345
NORTH DAKOTA STATE UNIVERSITY	U.V. Townhouse #148-159	1745 University Dr N	Fargo	$1,561,614
WILLISTON STATE COLLEGE	Oil & Gas Training Facility @ TrainND Northwest	421 22nd Ave E	Williston	$1,634,615
DOT MTCE & ENG SERVICES/GRAND FORKS	Grand Forks Equipment Storage	1951 N Washington	Grand Forks	$1,620,390
NORTH DAKOTA STATE UNIVERSITY	President's Home	1200 University Dr N	Fargo	$1,690,122
HETTINGER RESEARCH CENTER	Agronomy & Range Lab	102 1/2 Hwy 12 W	Hettinger	$1,649,539
ND SCHOOL FOR THE DEAF	Power Plant/Mechanical Equipment	1401 College Dr N	Devils Lake	$1,533,997
ND DEPT OF CORRECTIONS & REHABILITATION	Bldg B/Furniture Manufacturing	3303 East Main	Bismarck	$3,107,847
UNIVERSITY OF NORTH DAKOTA	EERC Fuel Prep-Testing	15 N 23rd St	Grand Forks	$2,324,258
ADJUTANT GENERAL, OFFICE OF THE	Veterans' Cemetery Storage Bldg	1825 46th St	Mandan	$1,475,423
CARRINGTON RESEARCH CENTER	Seed Cleaning Facility	663 Hwy 281 NE	Carrington	$1,465,750
NORTH DAKOTA STATE UNIVERSITY	16 Plex Housing #1	1745 University Dr N	Fargo	$1,681,379
NORTH DAKOTA STATE UNIVERSITY	16 Plex Housing #3	1745 University Dr N	Fargo	$1,680,796
ND DEPT OF CORRECTIONS & REHABILITATION	Maple Cottage Women's Dorm	701 16th Ave SW	Mandan	$1,604,318
ADJUTANT GENERAL, CAMP GRAFTON	Laboratory Instruction Building	4417 Hwy 20	Devils Lake	$1,437,800
ADJUTANT GENERAL, OFFICE OF THE	Administration	040 Fraine Barracks Lane	Bismarck	$1,463,561
NORTH DAKOTA STATE UNIVERSITY	Wiidikas Laboratory	1350 Bolley Dr	Fargo	$1,798,459
ND PARKS AND RECREATION DEPARTMENT	Historical Museum/Office	2040-001 4480 Fort Lincoln Rd	Mandan	$1,421,988
ADJUTANT GENERAL, OFFICE OF THE	UEVS Building	2033 4th St N	Wahpeton	$1,406,800
ND HISTORICAL SOCIETY	Hospital/Cafeteria	Cavalry Square	Ft. Totten	$1,400,000

Description	Building Name	Address	City	Insured Amount
ND WATER COMMISSION	Bismarck Maintenance/Storage	2901 E Main	Bismarck	$1,465,270
MINOT STATE UNIVERSITY	Vehicle/Storage Building	500 University Ave W	Minot	$1,618,600
ADJUTANT GENERAL, CAMP GRAFTON	TWDS Storage Building	4417 Hwy 20	Devils Lake	$1,377,200
ND DEPT OF CORRECTIONS & REHABILITATION	Jamestown Office/Manufacturing	1624 23rd St SE	Jamestown	$2,365,843
NDSU AG EXPERIMENT RESEARCH	Swine Confinement Barn	19th Ave North	Fargo	$1,392,174
DOT MTCE & ENG SERVICES/REST AREAS	Elm River Building	Interstate 29-North Bound	Kelso	$1,344,300
DOT MTCE & ENG SERVICES/REST AREAS	Elm River Building	Interstate 29-South Bound	Kelso	$1,344,300
UNIVERSITY OF NORTH DAKOTA	Vacant Babcock Hall	236 Centennial Dr	Grand Forks	$1,359,082
DOT MTCE & ENG SERVICES/BISMARCK	Bismarck Office Building	215 S Airport Rd	Bismarck	$1,867,389
ND HISTORICAL SOCIETY	Barracks 11 & 12/Boys Dorm	Cavalry Square	Ft. Totten	$1,335,400
BISMARCK STATE COLLEGE	Mystic Hall	1309 Schafer St	Bismarck	$1,362,583
ND STATE FAIR	Commercial Building III	2005 Burdick Expressway E	Minot	$1,326,300
ND STATE FAIR	Commercial Building I	2005 Burdick Expressway E	Minot	$1,325,300
ND STATE HOSPITAL	Dairy Barn	2426 Circle Dr	Jamestown	$1,318,050
DOT MTCE & ENG SERVICES/REST AREAS	WB Jamestown Building	4 Miles West of Jamestown	Jamestown	$1,302,300
DOT MTCE & ENG SERVICES/REST AREAS	EB Jamestown Building	4 Miles West of Jamestown	Jamestown	$1,302,300
BISMARCK STATE COLLEGE	RK Physical Plant Building	1613 Edwards Ave	Bismarck	$1,515,874
NORTH DAKOTA STATE UNIVERSITY	U.V. Townhouse #84-93	1745 University Dr N	Fargo	$1,301,822
NORTH DAKOTA STATE UNIVERSITY	U.V. Townhouse #174-183	1745 University Dr N	Fargo	$1,301,822
ND HEALTH DEPARTMENT	Forensic Examiner's Office & Morgue	2637 East Main Ave	Bismarck	$1,534,662
JOB SERVICE NORTH DAKOTA	Office Building	301 S College Dr	Devils Lake	$1,342,091
ND PARKS AND RECREATION DEPARTMENT	Historic Barracks	2040-067 4480 Fort Lincoln Rd	Mandan	$1,255,680
LAKE REGION STATE COLLEGE	North Housing Addition	1801 College Dr N	Devils Lake	$1,363,979
LAKE REGION STATE COLLEGE	South Housing Addition	1801 College Dr N	Devils Lake	$1,294,054
LANGDON RESEARCH CENTER	Agronomy/Pathology Lab	9280 107th Ave NE	Langdon	$1,497,023
ND STATE COLLEGE OF SCIENCE	Building Construction Tech/Track System	516 13th Ave N	Wahpeton	$1,250,745

Description	Building Name	Address	City	Insured Amount
UNIVERSITY OF NORTH DAKOTA	Gustafson Hall	3264 Campus Road	Grand Forks	$1,243,829
ND STATE FAIR	Grandstand Stage Roof	2005 Burdick Expressway E	Minot	$1,216,400
NORTH DAKOTA STATE UNIVERSITY	Potato Storage/Research	1220 16th St N	Fargo	$1,540,130
JOB SERVICE NORTH DAKOTA	Office Building	422 1st Ave W	Williston	$1,280,689
ADJUTANT GENERAL, OFFICE OF THE	Storage Building	3944 31st St N	Fargo	$1,208,600
ND HISTORICAL SOCIETY	Fort Mandan Visitor Center	838 28th Ave SW	Washburn	$1,200,200
ADJUTANT GENERAL, CAMP GRAFTON	Maintenance Shop	4417 Hwy 20	Devils Lake	$1,211,303
UNIVERSITY OF NORTH DAKOTA	President's Residence	1 Yale Dr	Grand Forks	$1,326,143
ADJUTANT GENERAL, CAMP GRAFTON	Engagement Skills Building	4417 Hwy 20	Devils Lake	$1,184,000
ND GAME AND FISH	Office Building	406 Dakota Ave	Riverdale	$1,701,284
WILLISTON RESEARCH CENTER	Seed Cleaning Facility	14120 Hwy 2	Williston	$1,174,600
ADJUTANT GENERAL, CAMP GRAFTON	Bachelor Officer Quarters	4417 Hwy 20	Devils Lake	$1,170,200
ADJUTANT GENERAL, CAMP GRAFTON	Bachelor Officer Quarters	4417 Hwy 20	Devils Lake	$1,170,200
JOB SERVICE NORTH DAKOTA	Office Building	66 Osborn Dr	Dickinson	$1,235,207
LANGDON RESEARCH CENTER	Seed House/Office/Addn	9280 107th Ave NE	Langdon	$1,291,280
ND HISTORICAL SOCIETY	Interpretive Center	935 Broadway	Abercrombie	$1,154,550
ADJUTANT GENERAL, OFFICE OF THE	Moving Target Simulator Bldg	1521 S 48th St	Grand Forks	$1,115,200
ADJUTANT GENERAL, OFFICE OF THE	Storage Building	747 7th St SE	Valley City	$1,111,300
ND STATE COLLEGE OF SCIENCE	Bleachers and Press Box	14 Ave N	Wahpeton	$1,100,000
VALLEY CITY STATE UNIVERSITY	Grandstand	1001 Viking Dr	Valley City	$1,105,991
DOT MTCE & ENG SERVICES/BISMARCK	Glen Ullin Office/Maintenance Building	4110 Co Rd 88	Glen Ullin	$1,171,608
DOT MTCE & ENG SERVICES/FARGO	Fargo Truck Barn/Breezeway	503 38th St S	Fargo	$1,174,680
UNIVERSITY OF NORTH DAKOTA	Safety Office	3851 Campus Road	Grand Forks	$1,472,447
WILLISTON STATE COLLEGE	Nelson Hall	613 E Highland Dr	Williston	$1,108,304
VALLEY CITY STATE UNIVERSITY	President's Residence	159 Viking Dr	Valley City	$1,108,573
NORTH DAKOTA STATE UNIVERSITY	U.V. Townhouse #94-104	1745 University Dr N	Fargo	$1,073,442
NORTH DAKOTA STATE UNIVERSITY	U.V. Townhouse #117-124	1745 University Dr N	Fargo	$1,042,550

Description	Building Name	Address	City	Insured Amount
NORTH DAKOTA STATE UNIVERSITY	U.V. Townhouse #160-167	1745 University Dr N	Fargo	$1,042,550
NORTH DAKOTA STATE UNIVERSITY	U.V. Townhouse #220-227	1745 University Dr N	Fargo	$1,042,550
NORTH DAKOTA STATE UNIVERSITY	U.V. Townhouse #257-264	1745 University Dr N	Fargo	$1,042,550
DOT MTCE & ENG SERVICES/DEVILS LAKE	Devils Lake Office	316 6th St SE	Devils Lake	$1,461,322
DOT MTCE & ENG SERVICES/BISMARCK	Underwood Equipment Building	337 Old Hwy 83	Underwood	$1,102,800
ND DEPT OF CORRECTIONS & REHABILITATION	Brown Cottage Men's Dorm	701 16th Ave SW	Mandan	$1,204,616
ADJUTANT GENERAL, OFFICE OF THE	Veteran's Cemetery Chapel	1825 46th St	Mandan	$1,043,424
ND GAME AND FISH	Office Building	1851 23rd Ave NE	Harvey	$1,187,282
WILLISTON STATE COLLEGE	Train ND Storage Building	421 22nd Ave NE - #3	Williston	$1,008,867
HETTINGER RESEARCH CENTER	Research Extension Center	102 1/2 Hwy 12 W	Hettinger	$1,236,547
ND STATE COLLEGE OF SCIENCE	Locker Room and Restrooms	14 Ave N	Wahpeton	$997,000
ADJUTANT GENERAL, OFFICE OF THE	Warehouse	280 Fraine Barracks Dr	Bismarck	$1,074,665
NORTH CENTRAL RESEARCH CENTER	Seed Cleaning Facility	5400 Hwy 83 South	Minot	$989,193
DOT MTCE & ENG SERVICES/GRAND FORKS	Grand Forks Salt Storage	1951 N Washington	Grand Forks	$985,600
ND DEPT OF CORRECTIONS & REHABILITATION	Chiller Building/Equipment/Exterior Chiller	3100 Railroad Ave	Bismarck	$978,600
ADJUTANT GENERAL, OFFICE OF THE	State Radio Operations	045 Fraine Barracks Lane	Bismarck	$975,600
ND PARKS AND RECREATION DEPARTMENT	Visitor's Center - Devils Lake	2150-055 152 S Duncan Rd	Devils Lake	$1,010,000
ND HISTORICAL SOCIETY	Ft Buford Barracks/Mess Hall	15349 39th Lane SW	Williston	$974,800
DOT MTCE & ENG SERVICES/FARGO	Hillsboro Section Building	590 6th St NW	Hillsboro	$1,032,300
NDSU AG EXPERIMENT RESEARCH	Beef Barn/Office	19th Ave North	Fargo	$994,274
ADJUTANT GENERAL, CAMP GRAFTON	Post Exchange/Service Club	4417 Hwy 20	Devils Lake	$953,300
ND ENVIRONMENTAL QUALITY DEPARTMENT	Office Training Center	2639 East Main Ave	Bismarck	$1,091,827
ND GAME AND FISH	Office Building	5303 Front St W	Williston	$1,258,213
DOT MTCE & ENG SERVICES/REST AREAS	EB Apple Creek Building	8 Miles East of Bismarck	Bismarck	$937,000

Description	Building Name	Address	City	Insured Amount
ADJUTANT GENERAL, CAMP GRAFTON	Facility Engineering Shop	4417 Hwy 20	Devils Lake	$1,051,328
ND STATE FAIR	4-H Exhibit Building	2005 Burdick Expressway E	Minot	$964,566
WILLISTON STATE COLLEGE	Heating Plant	1410 University Ave	Williston	$926,311
UNIVERSITY OF NORTH DAKOTA	Ray Richards Club House	3501 Demers Ave	Grand Forks	$933,840
ND GAME AND FISH	Shop Building	1851 23rd Ave NE	Harvey	$994,722
DOT MTCE & ENG SERVICES/REST AREAS	Larimore Building	Hwy 2/Mile 330	Larimore	$903,500
DOT MTCE & ENG SERVICES/REST AREAS	WB Hailstone Creek Building	8 Miles West of New Salem	New Salem	$895,000
UNIVERSITY OF NORTH DAKOTA	10-Plex W Green #5	301-319 Tulane Court	Grand Forks	$902,650
UNIVERSITY OF NORTH DAKOTA	8-Plex W Green #3	3707 Berkeley Dr	Grand Forks	$897,004
UNIVERSITY OF NORTH DAKOTA	Berkeley Drive Apartments	3702 Berkeley Dr	Grand Forks	$904,511
UNIVERSITY OF NORTH DAKOTA	8-Plex W Green #3	3712 Berkeley Dr	Grand Forks	$895,332
UNIVERSITY OF NORTH DAKOTA	8-Plex W Green #3	3717 Berkeley Dr	Grand Forks	$895,332
UNIVERSITY OF NORTH DAKOTA	8-Plex W Green #3	3722 Berkeley Dr	Grand Forks	$895,304
UNIVERSITY OF NORTH DAKOTA	8-Plex W Green #3	3805 Berkeley Dr	Grand Forks	$895,407
UNIVERSITY OF NORTH DAKOTA	8-Plex W Green #3	3810 Berkeley Dr	Grand Forks	$895,293
UNIVERSITY OF NORTH DAKOTA	8-Plex W Green #3	3815 Berkeley Dr	Grand Forks	$895,367
UNIVERSITY OF NORTH DAKOTA	8-Plex W Green #3	3820 Berkeley Dr	Grand Forks	$895,367
ADJUTANT GENERAL, CAMP GRAFTON	Medical Clinic	4417 Hwy 20	Devils Lake	$883,000
DOT MTCE & ENG SERVICES/REST AREAS	WB Apple Creek Building	8 Miles East of Bismarck	Bismarck	$879,200
DOT MTCE & ENG SERVICES/BISMARCK	Steele Equipment & Office Building	3840 25th Ave	Steele	$954,120
DICKINSON STATE UNIVERSITY	Main Campus Housing-Building A	717 11th Ave W	Dickinson	$896,966
DICKINSON STATE UNIVERSITY	Main Campus Housing-Building B	711 11th Ave W	Dickinson	$896,966
DICKINSON STATE UNIVERSITY	Main Campus Housing-Building C	715 11th Ave W	Dickinson	$896,966
DOT MTCE & ENG SERVICES/VALLEY CITY	Edgeley Maintenance Building	402 7th Ave East	Edgeley	$916,506
ND PARKS AND RECREATION DEPARTMENT	Visitor Center & Offices - Fort Ransom	5981 Walt Hjelle Parkway	Fort Ransom	$850,000

Description	Building Name	Address	City	Insured Amount
ND WATER COMMISSION	Dunn Center Booster Station	8401 1st St SW	Halliday	$847,300
ADJUTANT GENERAL, OFFICE OF THE	Heated Vehicle Storage	420 Fraine Barracks Loop	Bismarck	$844,700
UNIVERSITY OF NORTH DAKOTA	Building Mechanical Shop	3875 Campus Road	Grand Forks	$1,138,605
ADJUTANT GENERAL, CAMP GRAFTON	CP Headquarters	4417 Hwy 20	Devils Lake	$852,691
ADJUTANT GENERAL, CAMP GRAFTON	Warehouse	4417 Hwy 20	Devils Lake	$829,600
ND WATER COMMISSION	Round Lake Electrical Enclosure	4226 64th Ave NE	Minnewaukan	$828,200
ADJUTANT GENERAL, CAMP GRAFTON	Warehouse	4417 Hwy 20	Devils Lake	$825,700
ND DEPT OF CORRECTIONS & REHABILITATION	Bldg C/Upholstery/Furniture Assembly	3303 East Main	Bismarck	$1,045,685
ADJUTANT GENERAL, OFFICE OF THE	Unheated Storage Building	3409 Yegen Road	Bismarck	$821,200
ADJUTANT GENERAL, CAMP GRAFTON	Pump Station	4417 Hwy 20	Devils Lake	$820,500
ND STATE FAIR	Horse Barn II	2005 Burdick Expressway E	Minot	$1,160,547
ND PARKS AND RECREATION DEPARTMENT	Historic Arka Hall	2090-048 13571 Hwy 5	Cavalier	$815,500
ND GAME AND FISH	Office Building	225 30th Ave SW	Dickinson	$1,081,632
VALLEY CITY STATE UNIVERSITY	Facility Services	603 2nd Ave SE	Valley City	$844,686
CARRINGTON RESEARCH CENTER	Feed Mill/Elevator/Conveyors/Storage	6689 6th St NE	Carrington	$816,797
CENTRAL GRASSLANDS RESEARCH CENTER	Headquarters Office & Addition	4824 48th Ave SE	Streeter	$1,007,640
WILLISTON STATE COLLEGE	Manger Hall	609 E Highland Dr	Williston	$852,231
WILLISTON STATE COLLEGE	Abramson Hall	601 E Highland Dr	Williston	$847,750
ND DEPT OF CORRECTIONS & REHABILITATION	Chapel	701 16th Ave SW	Mandan	$863,726
UNIVERSITY OF NORTH DAKOTA	Safety Office/Chem Storage Building - Bldg S	15 N 23rd St	Grand Forks	$850,540
ADJUTANT GENERAL, OFFICE OF THE	Administration/Shop	190 Fraine Barracks Lane	Bismarck	$804,664
ND HIGHWAY PATROL	Outdoor Shooting Range	2300 66th Street NE	Bismarck	$792,000
NORTH DAKOTA STATE UNIVERSITY	U.V. Townhouse #125-130	1745 University Dr N	Fargo	$782,757
NORTH DAKOTA STATE UNIVERSITY	U.V. Townhouse #168-173	1745 University Dr N	Fargo	$782,757
NORTH DAKOTA STATE UNIVERSITY	U.V. Townhouse #184-189	1745 University Dr N	Fargo	$782,757
NORTH DAKOTA STATE UNIVERSITY	U.V. Townhouse #190-195	1745 University Dr N	Fargo	$782,757

Description	Building Name	Address	City	Insured Amount
NORTH DAKOTA STATE UNIVERSITY	U.V. Townhouse #196-201	1745 University Dr N	Fargo	$782,757
NORTH DAKOTA STATE UNIVERSITY	U.V. Townhouse #202-207	1745 University Dr N	Fargo	$782,757
NORTH DAKOTA STATE UNIVERSITY	U.V. Townhouse #208-213	1745 University Dr N	Fargo	$782,757
NORTH DAKOTA STATE UNIVERSITY	U.V. Townhouse #214-219	1745 University Dr N	Fargo	$782,757
NORTH DAKOTA STATE UNIVERSITY	U.V. Townhouse #228-233	1745 University Dr N	Fargo	$782,757
NORTH DAKOTA STATE UNIVERSITY	U.V. Townhouse #251-256	1745 University Dr N	Fargo	$782,757
CASSELTON RESEARCH CENTER	Seed House & Storage	15449 37th Street SE	Casselton	$808,572
ND DEPT OF CORRECTIONS & REHABILITATION	Observation Tower	3100 Railroad Ave	Bismarck	$776,865
ND WATER COMMISSION	Dickinson O & M Center	4665 2nd St SW	Dickinson	$801,621
VALLEY CITY STATE UNIVERSITY	Service/Storage Building	859 8th Ave SW	Valley City	$923,593
UNIVERSITY OF NORTH DAKOTA	American Indian Center	315 Princeton St	Grand Forks	$931,966
ND DEPT OF CORRECTIONS & REHABILITATION	Minimum Security Dorm	1800 48th Ave SW	Bismarck	$791,808
ND STATE HOSPITAL	Motor Vehicle Building	2328 Circle Dr	Jamestown	$851,373
ND DEPT OF CORRECTIONS & REHABILITATION	Metal Works Building	1800 48th Ave SW	Bismarck	$1,036,300
NDSU AG EXPERIMENT RESEARCH	Feed Mixing Building	3616 19th Ave N	Fargo	$1,016,394
NDSU AG EXPERIMENT RESEARCH	Sheep Barn	19th Ave North	Fargo	$787,961
ND WATER COMMISSION	Josephine Electrical Enclosure	6145 60th St	Minnewaukan	$757,100
ND DEPT OF CORRECTIONS & REHABILITATION	Office/Warehouse	3303 East Main	Bismarck	$1,348,000
ND STATE HOSPITAL	Superintendent's House	2212 Circle Dr	Jamestown	$747,693
ADJUTANT GENERAL, CAMP GRAFTON	Range Maintenance Shop	8870 Hwy 15	McHenry	$744,200
DAKOTA COLLEGE AT BOTTINEAU	Molberg Center	105 Simrall Blvd	Bottineau	$847,533
ND PARKS AND RECREATION DEPARTMENT	Historic Exhibit/Stables Bldg	2040-069 4480 Fort Lincoln Rd	Mandan	$738,600
ND HISTORICAL SOCIETY	Captain Quarters/Girl's Dorm	Cavalry Square	Ft. Totten	$738,200
ADJUTANT GENERAL, CAMP GRAFTON	Military Academy	4417 Hwy 20	Devils Lake	$738,100
ADJUTANT GENERAL, CAMP GRAFTON	Mess Hall Building	4417 Hwy 20	Devils Lake	$736,486

Description	Building Name	Address	City	Insured Amount
CARRINGTON RESEARCH CENTER	Agronomy Shop	661 Hwy 281 NE	Carrington	$795,146
UNIVERSITY OF NORTH DAKOTA	8-Plex W Green #5	401-415 Tulane Court	Grand Forks	$740,700
DOT MTCE & ENG SERVICES/BISMARCK	Bismarck Property Building	224 Airport Road	Bismarck	$1,580,047
DOT MTCE & ENG SERVICES/BISMARCK	Bismarck Traffic & Radio Building	216 Airport Road	Bismarck	$1,787,559
DOT MTCE & ENG SERVICES/DEVILS LAKE	Rugby Office/Maintenance Building	603 1st St NE	Rugby	$791,200
DAKOTA COLLEGE AT BOTTINEAU	Vacant Building	105 Simrall Blvd	Bottineau	$720,223
DOT MTCE & ENG SERVICES/BISMARCK	McClusky Equipment Building	215 Ave A West	McClusky	$778,240
NORTH DAKOTA STATE UNIVERSITY	Alba Bales Home Management	1260 University Dr N	Fargo	$751,314
ADJUTANT GENERAL, CAMP GRAFTON	Warehouse	4417 Hwy 20	Devils Lake	$731,914
DAKOTA COLLEGE AT BOTTINEAU	Central Heating Plant/Equipment	105 Simrall Blvd	Bottineau	$798,844
ADJUTANT GENERAL, CAMP GRAFTON	Chapel	4417 Hwy 20	Devils Lake	$698,200
ND HISTORICAL SOCIETY	Officer Quarters	101 W Main St	Bismarck	$694,600
ADJUTANT GENERAL, CAMP GRAFTON	Education Facility II	4417 Hwy 20	Devils Lake	$691,800
ND STATE HOSPITAL	Masonry Shop	2428 Circle Dr	Jamestown	$697,094
ADJUTANT GENERAL, CAMP GRAFTON	Supply Office/Warehouse	4417 Hwy 20	Devils Lake	$690,588
ADJUTANT GENERAL, CAMP GRAFTON	Administration Bldg	4417 Hwy 20	Devils Lake	$690,846
DOT MTCE & ENG SERVICES/DEVILS LAKE	Devils Lake Equipment Building	1905 Schwan Ave NW	Devils Lake	$788,080
ND PARKS AND RECREATION DEPARTMENT	Historic Woodland Lodge	2140-012 3084 Park Ave	Arvilla	$687,100
ND HISTORICAL SOCIETY	Gym	Cavalry Square	Ft. Totten	$686,500
DOT MTCE & ENG SERVICES/GRAND FORKS	Drayton Equipment Building	411 Hwy 66 West	Drayton	$757,100
ND PARKS AND RECREATION DEPARTMENT	Visitor Center	2050-001 1403 River Rd	Center	$692,807
UNIVERSITY OF NORTH DAKOTA	EERC Maintenance Shop-Bldg P	15 N 23rd St	Grand Forks	$1,607,532
ND STATE COLLEGE OF SCIENCE	Married Student Apt #1/Laundry	1501 East Dr	Wahpeton	$671,213
ND STATE COLLEGE OF SCIENCE	Married Student Apt #4/Laundry	1500 Center Dr	Wahpeton	$671,213
DOT MTCE & ENG SERVICES/MINOT	Minot Maintenance Building	1305 Hwy 2 Bypass E	Minot	$762,680

Description	Building Name	Address	City	Insured Amount
ADJUTANT GENERAL, OFFICE OF THE	Wash Rack Equipment Building	2135 7th St SE	Valley City	$658,800
DICKINSON STATE UNIVERSITY	President's Home/Garage	1071 5th St W	Dickinson	$691,595
ND STATE FAIR	Flickertail Garden	2005 Burdick Expressway E	Minot	$687,229
DOT MTCE & ENG SERVICES/REST AREAS	EB Hailstone Creek Building	9 Miles West of New Salem	New Salem	$647,100
NORTH DAKOTA STATE UNIVERSITY	Sugar Beet Research	1230 16th St N	Fargo	$1,007,226
ND HISTORICAL SOCIETY	Warehouse/Office	117 East Main	Bismarck	$640,000
ND WATER COMMISSION	Round Lake Electrical Enclosure	4226 64th Ave NE	Minnewaukan	$638,600
VALLEY CITY STATE UNIVERSITY	6-Plex Married Housing	604 Viking Dr	Valley City	$666,496
ND VISION SERVICES	Warehouse/Garage	500 Stanford Rd	Grand Forks	$765,924
ADJUTANT GENERAL, CAMP GRAFTON	Live Exercise Shoothouse	8870 Hwy 15	McHenry	$760,722
DOT MTCE & ENG SERVICES/MINOT	Minot Drivers License Building	2001 17th St SE	Minot	$676,930
ADJUTANT GENERAL, OFFICE OF THE	Maintenance Shop	250 Fraine Barracks Lane	Bismarck	$660,870
ND WATER COMMISSION	Josephine Electrical Enclosure	6145 60th St	Minnewaukan	$632,900
ADJUTANT GENERAL, OFFICE OF THE	Enclosed Vehicle Storage	3408 Yegen Rd	Bismarck	$632,800
ND PARKS AND RECREATION DEPARTMENT	Historic Custer's Home	2040-065 4480 Fort Lincoln Rd	Mandan	$632,600
ND STATE COLLEGE OF SCIENCE	Married Student Apt #2	1503 East Dr	Wahpeton	$635,254
ND STATE COLLEGE OF SCIENCE	Married Student Apt #3	1505 East Dr	Wahpeton	$635,254
ND STATE COLLEGE OF SCIENCE	Married Student Apt #5	1502 Center Drive	Wahpeton	$635,254
ND STATE COLLEGE OF SCIENCE	Married Student Apt #6	1506 Center Drive	Wahpeton	$635,254
DOT MTCE & ENG SERVICES/WILLISTON	Stanley Equipment Building	8250 62nd St NW	Stanley	$706,400
NORTH DAKOTA STATE UNIVERSITY	Grandstands/Pressbox	1701 15th Ave N	Fargo	$633,774
WILLISTON RESEARCH CENTER	Seedhouse/Office/Dust System	14120 Hwy 2	Williston	$744,435
DOT MTCE & ENG SERVICES/DEVILS LAKE	Carrington Maintenance Building	6739 Hwy 200	Carrington	$695,200
BISMARCK COMMUNITY BOWL	S Pressbox/Restroom/Concession	1701 Canary Ave	Bismarck	$629,643
DOT MTCE & ENG SERVICES/DEVILS LAKE	Langdon Equipment Building	10424 Hwy 5	Langdon	$681,200

Description	Building Name	Address	City	Insured Amount
ND PARKS AND RECREATION DEPARTMENT	Historic Granary	2040-068 4480 Fort Lincoln Rd	Mandan	$610,700
ND PARKS AND RECREATION DEPARTMENT	Visitor Center/Offices	2140-090 3084 Park Ave	Arvilla	$629,011
DOT MTCE & ENG SERVICES/BISMARCK	Bismarck Storage Building	226 Airport Road	Bismarck	$610,000
ADJUTANT GENERAL, CAMP GRAFTON	Non-Standard Magazine	4417 Hwy 20	Devils Lake	$609,000
ADJUTANT GENERAL, OFFICE OF THE	Joint Operation Center	1400 28th Ave N	Fargo	$602,400
ND FOREST SERVICE	Freezer/Shop Building (N)	878 Nursery Road	Towner	$658,207
ND HISTORICAL SOCIETY	Commanding Officer's Qtrs/Superintendent's Qtrs	Cavalry Square	Ft. Totten	$600,800
NORTH CENTRAL RESEARCH CENTER	Seed Cleaning Facility	5400 Hwy 83 South	Minot	$600,000
DOT MTCE & ENG SERVICES/GRAND FORKS	Grand Forks Drafting/Lab	1951 N Washington	Grand Forks	$1,659,359
DOT MTCE & ENG SERVICES/DICKINSON	Hettinger Section Building	1202 Airport Road	Hettinger	$665,200
ND FOREST SERVICE	Greenhouse with Equipment (H)	878 Nursery Road	Towner	$640,150
ND PARKS AND RECREATION DEPARTMENT	Historic Commissary	2040-066 4480 Fort Lincoln Rd	Mandan	$596,400
ND DEPT OF CORRECTIONS & REHABILITATION	Laundry Service	3100 Railroad Ave	Bismarck	$741,796
VALLEY CITY STATE UNIVERSITY	6-Plex Married Housing	604 Viking Dr	Valley City	$627,559
DOT MTCE & ENG SERVICES/DICKINSON	Beulah Section Building	1812 County Road 2	Beulah	$655,600
ADJUTANT GENERAL, OFFICE OF THE	Residence	020 Fraine Barracks Lane	Bismarck	$586,770
ND GAME AND FISH	Storage Building	7928 45th St NE	Devils Lake	$848,031
ADJUTANT GENERAL, CAMP GRAFTON	Education Facility	4417 Hwy 20	Devils Lake	$582,600
DOT MTCE & ENG SERVICES/REST AREAS	Crary Building	8 Miles SE of Crary/US 2	Crary	$578,500
DOT MTCE & ENG SERVICES/VALLEY CITY	Jamestown Equipment Building	1416 4th St NW	Jamestown	$678,380
DICKINSON STATE UNIVERSITY	Locker Rooms/Home Dugout	605 13th Ave W	Dickinson	$575,000
ND PARKS AND RECREATION DEPARTMENT	Shower/Restroom Facility	781 42 1/2 Ave NE	Pick City	$578,757
ND STATE FAIR	Jaycee's Building	2005 Burdick Expressway E	Minot	$681,131

Description	Building Name	Address	City	Insured Amount
DOT MTCE & ENG SERVICES/REST AREAS	NB Lake Agassiz Building	South of Hankinson/I-29	Hankinson	$571,300
DOT MTCE & ENG SERVICES/MINOT	Harvey Office/ Maintenance	501 Jackson Ave	Harvey	$638,800
DOT MTCE & ENG SERVICES/DICKINSON	Dickinson Equipment Building	1700 3rd Ave W Ste 101	Dickinson	$670,880
MINOT STATE UNIVERSITY	Apartment Housing	500 University Ave W	Minot	$565,800
DOT MTCE & ENG SERVICES/WILLISTON	Tioga Maintenance Building	425 2nd St SE	Tioga	$626,900
JOB SERVICE NORTH DAKOTA	Office Building	524 2nd Ave N	Wahpeton	$598,326
ND FOREST SERVICE	Office/Shop Building	Hwy 32 S	Lisbon	$642,032
ND HISTORICAL SOCIETY	Sew/Tailor	Cavalry Square	Ft. Totten	$559,350
LIFE SKILLS & TRANSITION CENTER	Superintendent's Home/Garage	701 West 6th St	Grafton	$561,814
ND PARKS AND RECREATION DEPARTMENT	2-Dormitories	2100-005/006 #2 Lake Metigoshe	Bottineau	$577,869
ADJUTANT GENERAL, CAMP GRAFTON	NCO Club	4417 Hwy 20	Devils Lake	$557,000
DOT MTCE & ENG SERVICES/WILLISTON	Williston DMV	605 Dakota Parkway West	Williston	$551,800
DAKOTA COLLEGE AT BOTTINEAU	Tech Shop/Classroom	105 Simrall Blvd	Bottineau	$644,529
DOT MTCE & ENG SERVICES/WILLISTON	Crosby Equipment Strg/Office	10320 119th Ave NW	Crosby	$615,500
ND WATER COMMISSION	Maintenance Building	3527 92nd Ave NE	Warwick	$570,066
DOT MTCE & ENG SERVICES/MINOT	Kenmare Equipment Building	49501 422 Ave NW	Kenmare	$610,900
ND PARKS AND RECREATION DEPARTMENT	Visitor Center & Offices	1252A 41st Ave NW	Garrison	$555,071
DOT MTCE & ENG SERVICES/VALLEY CITY	Medina Equipment Building	3682 55th Ave SE	Medina	$618,800
ADJUTANT GENERAL, CAMP GRAFTON	Senior NCO and Officer Billeting	4417 Hwy 20	Devils Lake	$535,900
ADJUTANT GENERAL, CAMP GRAFTON	Lodging	4417 Hwy 20	Devils Lake	$535,900
DOT MTCE & ENG SERVICES/DICKINSON	Mott Maintenance Building	7105 Hwy 8	Mott	$602,900
UNIVERSITY OF NORTH DAKOTA	EERC HPT Demo Building	15 N 23rd St	Grand Forks	$1,691,492
DOT MTCE & ENG SERVICES/GRAND FORKS	Cooperstown Section Building	11351 3rd St NE	Cooperstown	$604,100
ND HISTORICAL SOCIETY	Field Office Head Quarters	15349 39th Lane NW	Williston	$526,000

Description	Building Name	Address	City	Insured Amount
DOT MTCE & ENG SERVICES/BISMARCK	Napoleon Equipment Building	59 Broadway	Napoleon	$581,700
ADJUTANT GENERAL, CAMP GRAFTON	Warehouse	4417 Hwy 20	Devils Lake	$513,400
ADJUTANT GENERAL, OFFICE OF THE	Heated Vehicle Storage	3945 31st St N	Fargo	$512,600
ND PARKS AND RECREATION DEPARTMENT	Shower & Rest Room-Garrison	2070-016 1252A 41st Ave NW	Garrison	$511,200
ND PARKS AND RECREATION DEPARTMENT	Shower & Restroom in Bottineau	2100-028 #2 Lake Metigoshe State Park	Bottineau	$511,200
ND PARKS AND RECREATION DEPARTMENT	Shower & Restroom in Cavalier	13571 Highway 5	Cavalier	$509,000
ND GAME AND FISH	Shop and Lab Building	403 Dakota Ave	Riverdale	$850,020
DOT MTCE & ENG SERVICES/DICKINSON	Belfield Maintenance Building		Belfield	$571,000
DOT MTCE & ENG SERVICES/GRAND FORKS	Michigan Equipment Building	519 South St	Michigan	$584,000
DICKINSON STATE UNIVERSITY	Maintenance Bldg/Office	291 Campus Dr	Dickinson	$972,549
ND STATE COLLEGE OF SCIENCE	Concessions and Visitor Locker Room	14 Ave N	Wahpeton	$504,218
ADJUTANT GENERAL, CAMP GRAFTON	Consolidated Mess Hall	4417 Hwy 20	Devils Lake	$504,100
DOT MTCE & ENG SERVICES/GRAND FORKS	Larimore Equipment Storage Bldg	1524 Towner Ave	Larimore	$577,700
ND DEPT OF CORRECTIONS & REHABILITATION	Raw Material Storage/Dairy Barn	3303 East Main	Bismarck	$646,367
UNIVERSITY OF NORTH DAKOTA	Hopper-Danley Memorial Center	3285 Davis Dr	Grand Forks	$503,958
CARRINGTON RESEARCH CENTER	Seed House/Office	667 Hwy 281 NE	Carrington	$564,193
ND HISTORICAL SOCIETY	Carriage House	320 E Ave B	Bismarck	$493,500
LANGDON RESEARCH CENTER	Shop/Machine Storage	9280 107th Ave NE	Langdon	$524,030
DOT MTCE & ENG SERVICES/BISMARCK	Linton Equipment Building	820 Hwy 13 SE	Linton	$559,260
ADJUTANT GENERAL, OFFICE OF THE	Multi-Purpose Building	210 Fraine Barracks Lane	Bismarck	$526,239
ND STATE HOSPITAL	TL-2	2211 Cottage Lane	Jamestown	$492,667
NORTH CENTRAL RESEARCH CENTER	Machine Storage & Addition	5400 Hwy 83 South	Minot	$481,300
LANGDON RESEARCH CENTER	Superintendent Residence	9280 107th Ave NE	Langdon	$488,300

Description	Building Name	Address	City	Insured Amount
ADJUTANT GENERAL, CAMP GRAFTON	Classroom	4774 77th Ave NE	Devils Lake	$475,800
DICKINSON RESEARCH CENTER	White House Storage Building	1089 State Ave	Dickinson	$504,228
ND PARKS AND RECREATION DEPARTMENT	House/Garage	2090-016 13571 Hwy 5	Cavalier	$471,440
NORTH DAKOTA STATE UNIVERSITY	Maintenance/Supply Building	1517 13th Ave N	Fargo	$1,160,195
ADJUTANT GENERAL, CAMP GRAFTON	Simulations Center	8870 Hwy 15	McHenry	$465,900
ND STATE FAIR	44-Unit Storage Facility	2008 Burdick Expressway East	Minot	$464,640
DICKINSON RESEARCH CENTER	Director's Residence	1085 State Ave	Dickinson	$468,551
DICKINSON RESEARCH CENTER	Bldg B/Elevator	1041 State Ave	Dickinson	$462,471
ND PARKS AND RECREATION DEPARTMENT	Shower & Restroom - Arvilla	2140-036 3084 Park Avenue	Arvilla	$460,500
CENTRAL GRASSLANDS RESEARCH CENTER	Agronomy Lab	4824 48th Ave SE	Streeter	$553,711
ND HISTORICAL SOCIETY	Commissary/Interpretive Center	Cavalry Square	Ft. Totten	$482,624
ND STATE HOSPITAL	Pump House/Equipment	2403 Circle Dr	Jamestown	$457,000
ND GAME AND FISH	Office Building	7928 45th St NE	Devils Lake	$821,462
DICKINSON STATE UNIVERSITY	Concession Stand/ Restrooms	605 13th Ave W	Dickinson	$450,000
ND GAME AND FISH	Dwelling/Garage	1871 23rd Ave NE	Harvey	$456,997
ADJUTANT GENERAL, CAMP GRAFTON	Storage Building	4417 Hwy 20	Devils Lake	$444,600
ADJUTANT GENERAL, CAMP GRAFTON	Range Operations/Cold Storage	8870 Hwy 15	McHenry	$452,588
UNIVERSITY OF NORTH DAKOTA	6-Plex W Green #5	417-427 Tulane Court	Grand Forks	$448,750
DOT MTCE & ENG SERVICES/DICKINSON	Killdeer Maintenance Building	398 Hwy 22 S	Killdeer	$505,000
NORTH DAKOTA STATE UNIVERSITY	Parking Office	15th Ave North	Fargo	$485,277
DOT MTCE & ENG SERVICES/DEVILS LAKE	Devils Lake Maintenance Storage	1905 Schwan Ave NW	Devils Lake	$753,268
ND DEPT OF CORRECTIONS & REHABILITATION	Sunny Farm Dairy Barn	4095 Sunny Dr South	Mandan	$429,600
DOT MTCE & ENG SERVICES/MINOT	Parshall Equipment Bldg	7198 38th St NW	Parshall	$494,600
ADJUTANT GENERAL, OFFICE OF THE	Site Entrance Facility/Screening Wall	2001 4th St N	Wahpeton	$426,600

Description	Building Name	Address	City	Insured Amount
ND STATE FAIR	Horse Barn I	2005 Burdick Expressway E	Minot	$475,375
ND HISTORICAL SOCIETY	Warehouse	6115 & 6131 E Main Ave	Bismarck	$424,700
ND DEPT OF CORRECTIONS & REHABILITATION	Motor Pool	701 16th Ave SW	Mandan	$456,345
DOT MTCE & ENG SERVICES/MINOT	Bottineau Maintenance Storage	9840 Lake Road	Bottineau	$488,400
DOT MTCE & ENG SERVICES/VALLEY CITY	Wishek Maintenance Storage	212 2nd St S	Wishek	$491,000
ADJUTANT GENERAL, CAMP GRAFTON	Canopy	4417 Hwy 20	Devils Lake	$418,600
ND STATE FAIR	4-H & FFA Barn	2005 Burdick Expressway E	Minot	$467,433
UNIVERSITY OF NORTH DAKOTA	4-Plex W Green #5	302-308 Tulane Court	Grand Forks	$418,700
ND DEPT OF CORRECTIONS & REHABILITATION	East Tower/Catwalk	3100 Railroad Ave	Bismarck	$426,154
ND HISTORICAL SOCIETY	Building House	12882 105th St NE	Wahalla	$408,000
DOT MTCE & ENG SERVICES/FARGO	Wahpeton Equipment Storage/Office	7930 180 Ave SE	Wahpeton	$472,400
ND GAME AND FISH	Cold Storage Building - Devils Lake	7928 45th St NE	Devils Lake	$494,000
DOT MTCE & ENG SERVICES/REST AREAS	Alexander Henry Building	3 Miles N of ND 17 on I-29	Grafton	$396,800
ND DEPT OF CORRECTIONS & REHABILITATION	Visitors Building	3100 Railroad Ave	Bismarck	$452,203
DOT MTCE & ENG SERVICES/GRAND FORKS	Grand Forks Sign Shop	1951 N Washington	Grand Forks	$395,200
VALLEY CITY STATE UNIVERSITY	4-Plex Married Housing	604 Viking Dr	Valley City	$414,149
DOT MTCE & ENG SERVICES/WILLISTON	Williston Salt/Sand	605 Dakota Parkway W	Williston	$423,042
ND PARKS AND RECREATION DEPARTMENT	Administrative Office	2110-182 781 42 1/2 Ave NW	Pick CIty	$407,132
VALLEY CITY STATE UNIVERSITY	Metals Lab	203 6th St SE	Valley City	$1,818,875
ADJUTANT GENERAL, CAMP GRAFTON	CP Superintendent's Office	4417 Hwy 20	Devils Lake	$391,700
HETTINGER RESEARCH CENTER	Confinement Barn	102 1/2 Hwy 12 W	Hettinger	$392,965
ADJUTANT GENERAL, CAMP GRAFTON	Ammo Storage Building	4417 Hwy 20	Devils Lake	$387,100
ND FOREST SERVICE	Office Building (K)	3 Miles North of City	Towner	$443,500

Description	Building Name	Address	City	Insured Amount
ND STATE HOSPITAL	2308 CTC House	2308 Circle Dr	Jamestown	$380,684
ND STATE HOSPITAL	2206	2206 Cottage Lane	Jamestown	$377,681
ND STATE HOSPITAL	TL-1	2208 Cottage Lane	Jamestown	$377,681
DOT MTCE & ENG SERVICES/WILLISTON	New Town Section Line Building	401 4th Ave SW	New Town	$453,600
ADJUTANT GENERAL, CAMP GRAFTON	Administration Bldg	4417 Hwy 20	Devils Lake	$374,200
ND PARKS AND RECREATION DEPARTMENT	Thompson Activity Bldg	2150-032 152 S Duncan Rd	Devils Lake	$375,184
ADJUTANT GENERAL, CAMP GRAFTON	Administration Bldg	4417 Hwy 20	Devils Lake	$373,500
ADJUTANT GENERAL, CAMP GRAFTON	Administration Bldg	4417 Hwy 20	Devils Lake	$373,500
ADJUTANT GENERAL, CAMP GRAFTON	9-Barracks	4417 Hwy 20	Devils Lake	$373,500
ADJUTANT GENERAL, CAMP GRAFTON	9-Barracks	4417 Hwy 20	Devils Lake	$373,500
DICKINSON RESEARCH CENTER	Dwelling II-Red House	11092 15th St SW	Manning	$375,115
DAKOTA COLLEGE AT BOTTINEAU	Interactive Video Network Classroom	105 Simrall Blvd	Bottineau	$437,224
ND PARKS AND RECREATION DEPARTMENT	Maintenance Shop	2040-044 4480 Fort Lincoln Rd	Mandan	$383,649
DOT MTCE & ENG SERVICES/FARGO	Fargo Salt Storage Building	503 38th St S	Fargo	$363,000
ND PARKS AND RECREATION DEPARTMENT	Historic Hallson Church Museum	2090-052 13571 Hwy 5	Cavalier	$358,700
WILLISTON RESEARCH CENTER	Residence/Attached Garage	14120 Hwy 2	Williston	$363,181
ADJUTANT GENERAL, CAMP GRAFTON	Lodging	4417 Hwy 20	Devils Lake	$357,800
ADJUTANT GENERAL, OFFICE OF THE	Fuel Truck Containment Shelter	3420 2nd St NE	Minot	$356,600
ND STATE HOSPITAL	2209	2209 Cottage Lane	Jamestown	$359,384
ND STATE HOSPITAL	2207	2207 Cottage Lane	Jamestown	$359,384
ND STATE HOSPITAL	2205	2205 Cottage Lane	Jamestown	$357,085
DOT MTCE & ENG SERVICES/WILLISTON	Watford City Section Building	105 10th St SW	Watford City	$429,400
ND STATE HOSPITAL	NDSH Lift Station	2318 Circle Dr	Jamestown	$354,000
HETTINGER RESEARCH CENTER	Residence/Attached Garage	102 1/2 Hwy 12 W	Hettinger	$360,354
ND DEPT OF CORRECTIONS & REHABILITATION	Superintendent's Residence	701 16th Ave SW	Mandan	$399,516
DOT MTCE & ENG SERVICES/FARGO	Casselton Equipment Strg/Office	15482 37th St SE	Casselton	$424,900

Description	Building Name	Address	City	Insured Amount
ND STATE HOSPITAL	Grounds Maintenance Building	2534 Circle Dr	Jamestown	$373,498
ADJUTANT GENERAL, CAMP GRAFTON	Dwelling/Garage	4417 Hwy 20	Devils Lake	$345,000
LIFE SKILLS & TRANSITION CENTER	Cottage/Garage #3	701 West 6th St	Grafton	$345,111
DAKOTA COLLEGE AT BOTTINEAU	Molberg Greenhouse	105 Simrall Blvd	Bottineau	$364,306
DOT MTCE & ENG SERVICES/REST AREAS	Oriska Building	2 Miles East of Oriska	Oriska	$340,600
ND DEPT OF CORRECTIONS & REHABILITATION	Lift Station/Equipment	3100 Railroad Ave	Bismarck	$338,300
CARRINGTON RESEARCH CENTER	West Shop	675 Hwy 281 NE	Carrington	$379,608
DOT MTCE & ENG SERVICES/VALLEY CITY	Valley City Equipment Building	1524 8 Ave SW	Valley City	$335,700
ND STATE SEED DEPARTMENT	Branch Office	873 West 12th St/Hwy 17	Grafton	$355,606
DICKINSON RESEARCH CENTER	Arena	11090 15th St SW	Manning	$342,310
DOT MTCE & ENG SERVICES/BISMARCK	Bismarck Salt/Sand Storage	218 Airport Road	Bismarck	$357,942
ADJUTANT GENERAL, OFFICE OF THE	Access Control Facility	3400 40th Ave N	Fargo	$330,000
ADJUTANT GENERAL, OFFICE OF THE	Access Control Facility	010 Fraine Barracks Lane	Bismarck	$329,104
VALLEY CITY STATE UNIVERSITY	Ceramics Building	228 6th St SE	Valley City	$421,458
ADJUTANT GENERAL, CAMP GRAFTON	Laundromat	4417 Hwy 20	Devils Lake	$325,700
ADJUTANT GENERAL, CAMP GRAFTON	Edwards House	4417 Hwy 20	Devils Lake	$325,600
DOT MTCE & ENG SERVICES/DICKINSON	Bowman Equipment Bldg/Addition	8507 147 Ave SW	Bowman	$392,500
ADJUTANT GENERAL, CAMP GRAFTON	9-Barracks	4417 Hwy 20	Devils Lake	$323,100
ADJUTANT GENERAL, CAMP GRAFTON	9-Barracks	4417 Hwy 20	Devils Lake	$323,100
ADJUTANT GENERAL, CAMP GRAFTON	9-Barracks	4417 Hwy 20	Devils Lake	$323,100
ADJUTANT GENERAL, CAMP GRAFTON	9-Barracks	4417 Hwy 20	Devils Lake	$323,100
ADJUTANT GENERAL, CAMP GRAFTON	9-Barracks	4417 Hwy 20	Devils Lake	$323,100
ADJUTANT GENERAL, CAMP GRAFTON	9-Barracks	4417 Hwy 20	Devils Lake	$323,100
ADJUTANT GENERAL, CAMP GRAFTON	9-Barracks	4417 Hwy 20	Devils Lake	$323,100

Description	Building Name	Address	City	Insured Amount
ADJUTANT GENERAL, CAMP GRAFTON	9-Barracks	4417 Hwy 20	Devils Lake	$323,100
ADJUTANT GENERAL, CAMP GRAFTON	Unheated Storage Building	8870 Hwy 15	McHenry	$323,100
ADJUTANT GENERAL, CAMP GRAFTON	9-Barracks	4417 Hwy 20	Devils Lake	$323,100
ADJUTANT GENERAL, CAMP GRAFTON	9-Barracks	4417 Hwy 20	Devils Lake	$323,100
ADJUTANT GENERAL, CAMP GRAFTON	Residence	4417 Hwy 20	Devils Lake	$322,600
ADJUTANT GENERAL, CAMP GRAFTON	SIRE Building	4417 Hwy 20	Devils Lake	$321,600
DOT MTCE & ENG SERVICES/FARGO	Fargo Radio Building	503 38th St S	Fargo	$362,061
ND DEPT OF CORRECTIONS & REHABILITATION	Security Check Point/Gun Vault	2521 Circle Drive	Jamestown	$339,133
ND PARKS AND RECREATION DEPARTMENT	Restroom	2040-025 4480 Fort Lincoln Rd	Mandan	$317,700
ND PARKS AND RECREATION DEPARTMENT	Shop/Office/Storage	2100-032 #2 Lake Metigoshe	Bottineau	$324,731
ND HISTORICAL SOCIETY	Ft Lincoln Storage Building	4480 Fort Lincoln Road	Mandan	$316,900
ND HISTORICAL SOCIETY	Quartermaster's Store/Bakery, Harness Shop	Cavalry Square	Ft. Totten	$314,100
BISMARCK COMMUNITY BOWL	Storage Building	1701 Canary Ave	Bismarck	$330,688
DICKINSON STATE UNIVERSITY	King Pavilion	8th Ave 3rd St	Dickinson	$311,500
ND GAME AND FISH	Storage	403 Dakota Ave	Riverdale	$311,130
ND STATE FAIR	Midway Restroom	2005 Burdick Expressway E	Minot	$310,700
ND HOUSING FINANCE AGENCY	Single Family w/ Garage	2640 Terrace View Dr	Watford City	$310,540
DOT MTCE & ENG SERVICES/DICKINSON	Dickinson Salt/Sand Structure	1700 3rd Ave W	Dickinson	$328,503
CASSELTON RESEARCH CENTER	Superintendent's House/Garage	15449 37th Street SE	Casselton	$314,581
ND SCHOOL FOR THE DEAF	Laundry/Garage	1401 College Dr N	Devils Lake	$335,927
CARRINGTON RESEARCH CENTER	Superintendent Residence	663 Hwy 281 NE	Carrington	$312,016
NDSU AG EXPERIMENT RESEARCH	Storage Building	5 Miles N on Cass Co Hwy 20	Fargo	$308,100
ADJUTANT GENERAL, CAMP GRAFTON	Military Service Club	4417 Hwy 20	Devils Lake	$306,600
ND HISTORICAL SOCIETY	Building Post	12882 105th St NE	Wahalla	$304,000

Description	Building Name	Address	City	Insured Amount
WILLISTON STATE COLLEGE	Buildings and Ground Shop	1410 University Ave	Williston	$451,731
DOT MTCE & ENG SERVICES/DICKINSON	Beach Equipment Bldg & Office	16841 Old Hwy 10	Beach	$380,100
HETTINGER RESEARCH CENTER	Storage Building	102 1/2 Hwy 12 W	Hettinger	$299,948
ND STATE HOSPITAL	Sewage Lift Station/Equipment	2320 Circle Dr	Jamestown	$299,700
ND FOREST SERVICE	Office/Shop Building (A)	Forestry Drive	Bottineau	$379,438
DOT MTCE & ENG SERVICES/GRAND FORKS	Grafton Equipment Bldg/Addition	333 Commerce St	Grafton	$365,990
DICKINSON RESEARCH CENTER	Grad Residence	11533 34th St SW	Dickinson	$305,607
ND PARKS AND RECREATION DEPARTMENT	Maintenance/Office	2070-026 1252A 41st Ave NW	Garrison	$321,332
ND PARKS AND RECREATION DEPARTMENT	3-822 Sq Ft Cabins	2140-019-020-021 3084 Park Ave	Arvilla	$297,300
ND PARKS AND RECREATION DEPARTMENT	3-Cabins	2140-032-033-034 3084 Park Ave	Arvilla	$297,300
MINOT STATE UNIVERSITY	Amphitheater	500 University Ave W	Minot	$402,644
NORTH CENTRAL RESEARCH CENTER	Seed Plant Complex	5400 Hwy 83 South	Minot	$722,445
ND PARKS AND RECREATION DEPARTMENT	Superintendent's House	2040-046 4480 Fort Lincoln Rd	Mandan	$295,680
ND GAME AND FISH	Fishery Storage Building	3001 East Main St	Bismarck	$519,557
ND GAME AND FISH	Wildlife Storage Building	3001 East Main St	Bismarck	$519,557
ND HISTORICAL SOCIETY	Locomotive Shelter/Wrought Iron Fence	101 E Main	Bismarck	$290,700
HETTINGER RESEARCH CENTER	Multi-Purpose Building	102 1/2 Hwy 12 W	Hettinger	$390,528
ADJUTANT GENERAL, OFFICE OF THE	Equipment Storage Building	220 Fraine Barracks Lane	Bismarck	$289,400
ND STATE HOSPITAL	Warehouse	2426 Circle Dr	Jamestown	$302,770
ADJUTANT GENERAL, CAMP GRAFTON	Administration Bldg	4417 Hwy 20	Devils Lake	$287,900
NDSU AG EXPERIMENT RESEARCH	Sheep Barn	19th Ave North	Fargo	$287,200
ADJUTANT GENERAL, CAMP GRAFTON	Residence	4417 Hwy 20	Devils Lake	$285,100
ND WATER COMMISSION	Zap Oxygen Generation Building	101 Co Road 13	Zap	$284,000
ADJUTANT GENERAL, OFFICE OF THE	Fuel Truck Containment Shelter*	4360 E Miriam Ave	Bismarck	$282,900

Description	Building Name	Address	City	Insured Amount
ND HISTORICAL SOCIETY	Adjutant's/School Office	Cavalry Square	Ft. Totten	$282,150
ADJUTANT GENERAL, CAMP GRAFTON	Mess Hall/Classroom	8870 Hwy 15	McHenry	$281,500
UNIVERSITY OF NORTH DAKOTA	EERC Storage Building #3	2219 Dyke Ave	Grand Forks	$1,121,250
ND STATE HOSPITAL	2326 Rental House	2326 Circle Dr	Jamestown	$282,181
ND HEALTH DEPARTMENT	Storage Building	2635 E Main Ave	Bismarck	$373,642
ND PARKS AND RECREATION DEPARTMENT	Ranger's House	2040-048 4480 Fort Lincoln Rd	Mandan	$280,492
ND PARKS AND RECREATION DEPARTMENT	Concession/Office/Restroom	2070-021 1252A 41st Ave NW	Garrison	$278,759
ND HISTORICAL SOCIETY	2nd Lt. Qtrs/Print Shop	Cavalry Square	Ft. Totten	$278,000
LIFE SKILLS & TRANSITION CENTER	Cottage/Garage #1	701 West 6th St	Grafton	$280,311
LIFE SKILLS & TRANSITION CENTER	Cottage/Garage #2	701 West 6th St	Grafton	$280,311
LIFE SKILLS & TRANSITION CENTER	Cottage/Garage #4	701 West 6th St	Grafton	$280,311
LIFE SKILLS & TRANSITION CENTER	Cottage/Garage #5	701 West 6th St	Grafton	$280,311
ND HISTORICAL SOCIETY	Church	101 W Main St	Bismarck	$276,800
ADJUTANT GENERAL, OFFICE OF THE	Residence	360 Fraine Barracks Loop	Bismarck	$276,660
ND SCHOOL FOR THE DEAF	Supt Residence/Garage	1401 College Dr N	Devils Lake	$277,676
ADJUTANT GENERAL, OFFICE OF THE	Aircraft Wash Rack Building	3416 Yegen Rd	Bismarck	$274,700
DOT MTCE & ENG SERVICES/WILLISTON	Williston Equipment Building	605 Dakota Parkway W	Williston	$274,000
DOT MTCE & ENG SERVICES/DEVILS LAKE	Devils Lake Salt/Sand Dome	1905 Schwan Ave NW in Devils Lake	Devils Lake	$273,100
DOT MTCE & ENG SERVICES/DEVILS LAKE	Rolla Equipment Bldg & Office	113 1st St NW	Rolla	$350,500
MAYVILLE STATE UNIVERSITY	Central Receiving Facility	Stan Dakken Dr	Mayville	$335,072
DOT MTCE & ENG SERVICES/MINOT	Minot Storage Building	1305 Hwy 2 Bypass E	Minot	$266,900
ADJUTANT GENERAL, CAMP GRAFTON	Residence	4417 Hwy 20	Devils Lake	$266,400
CARRINGTON RESEARCH CENTER	Plot Laboratory/Storage	663 Hwy 281 NE	Carrington	$276,592
ND STATE FAIR	Caretaker's House/Garage	2005 Burdick Expressway E	Minot	$265,200

Description	Building Name	Address	City	Insured Amount
ADJUTANT GENERAL, OFFICE OF THE	Residence	380 Fraine Barracks Loop	Bismarck	$264,240
ND PARKS AND RECREATION DEPARTMENT	Carpenter Shop	2040-017 4480 Fort Lincoln Rd	Mandan	$293,843
ADJUTANT GENERAL, CAMP GRAFTON	Office Building	4417 Hwy 20	Devils Lake	$263,300
ADJUTANT GENERAL, OFFICE OF THE	Fuel Containment & Equipment	3917 31st St NW	Fargo	$262,100
NDSU AG EXPERIMENT RESEARCH	Animal Holding Facility	19th Ave North	Fargo	$272,113
DOT MTCE & ENG SERVICES/FARGO	Wyndmere Salt/Sand Storage	7775 Hwy 18	Wyndmere	$260,000
DICKINSON RESEARCH CENTER	Equipment Storage	11090 15th St SW	Manning	$262,753
VALLEY CITY STATE UNIVERSITY	Storage Building	989 Viking Drive SW	Valley City	$291,487
ADJUTANT GENERAL, CAMP GRAFTON	Pesticide Mixing Building & Canopy	8870 Hwy 15	McHenry	$259,400
ND PARKS AND RECREATION DEPARTMENT	Storage Building	2090-042 13571 Hwy 5	Cavalier	$266,250
ADJUTANT GENERAL, CAMP GRAFTON	Office Building	4417 Hwy 20	Devils Lake	$258,700
NORTH DAKOTA STATE UNIVERSITY	Resident Life Facility	1230 Bolley Dr	Fargo	$274,207
ADJUTANT GENERAL, CAMP GRAFTON	Administration Bldg	4417 Hwy 20	Devils Lake	$255,800
DOT MTCE & ENG SERVICES/BISMARCK	Flasher Equipment Bldg & Office	6590 Co Rd 84	Flasher	$323,280
DAKOTA COLLEGE AT BOTTINEAU	Physical Plant Shop	105 Simrall Blvd	Bottineau	$371,835
LANGDON RESEARCH CENTER	Machine Storage Building	9280 107th Ave NE	Langdon	$275,630
ADJUTANT GENERAL, OFFICE OF THE	Garage/Utility Building	310 Fraine Barracks Dr	Bismarck	$258,009
ND STATE COLLEGE OF SCIENCE	Cold Storage Building	800 6th Ave N	Wahpeton	$252,600
HETTINGER RESEARCH CENTER	Main Barn	102 1/2 Hwy 12 W	Hettinger	$256,990
DOT MTCE & ENG SERVICES/BISMARCK	Selfridge Equipment Bldg & Office	9510 26th Ave	Selfridge	$319,520
UNIVERSITY OF NORTH DAKOTA	EERC Storage Building #2	15 N 23rd St	Grand Forks	$776,829
DOT MTCE & ENG SERVICES/MINOT	Minot Salt/Sand Storage	1305 Hwy 2 Bypass E	Minot	$268,788
ADJUTANT GENERAL, OFFICE OF THE	Security Building	3400 Yegen Rd	Bismarck	$250,100
ND HISTORICAL SOCIETY	Lewis & Clark Fort Replica	2576 8th St SW	Washburn	$250,000

Description	Building Name	Address	City	Insured Amount
ND GAME AND FISH	Storage Building	1851 23rd Ave NE	Harvey	$353,557
CASSELTON RESEARCH CENTER	House/Attached Garage	15449 37th Street SE	Casselton	$253,181
DOT MTCE & ENG SERVICES/MINOT	Velva Equipment Building	4384 Hwy 41	Velva	$316,000
ND PARKS AND RECREATION DEPARTMENT	House/Garage	2150-020 152 S Duncan Rd	Devils Lake	$247,769
ADJUTANT GENERAL, CAMP GRAFTON	Fuel Truck Containment	4417 Hwy 20	Devils Lake	$244,500
LANGDON RESEARCH CENTER	Machine Storage Building	9280 107th Ave NE	Langdon	$263,610
ADJUTANT GENERAL, OFFICE OF THE	UH-72 L.H.S. Storage Building	3407 Yegen Road	Bismarck	$242,600
CARRINGTON RESEARCH CENTER	Dwelling #2	663 Hwy 281 NE	Carrington	$243,835
ND GAME AND FISH	Storage Building	3001 East Main St	Bismarck	$309,628
ND GAME AND FISH	Dwelling/Garage	1861 23rd Ave NE	Harvey	$247,069
ND FOREST SERVICE	Office Building	101 5th St	Walhalla	$269,021
ADJUTANT GENERAL, CAMP GRAFTON	Enlisted's Latrine	4417 Hwy 20	Devils Lake	$240,000
ADJUTANT GENERAL, CAMP GRAFTON	Enlisted's Latrine	4417 Hwy 20	Devils Lake	$240,000
ND DEPT OF CORRECTIONS & REHABILITATION	Maintenance/Inventory Storage	2521 Circle Drive	Jamestown	$281,169
ADJUTANT GENERAL, CAMP GRAFTON	Administration Bldg	4417 Hwy 20	Devils Lake	$238,900
ADJUTANT GENERAL, CAMP GRAFTON	Administration Bldg	4417 Hwy 20	Devils Lake	$238,900
ADJUTANT GENERAL, CAMP GRAFTON	Administration Bldg	4417 Hwy 20	Devils Lake	$238,900
ADJUTANT GENERAL, CAMP GRAFTON	Administration Bldg	4417 Hwy 20	Devils Lake	$238,900
DOT MTCE & ENG SERVICES/VALLEY CITY	Jamestown Salt/Sand Storage	3568 81 R Ave SE	Jamestown	$258,603
ND GAME AND FISH	Warden's Storage with Cooler	3001 East Main St	Bismarck	$374,858
UNIVERSITY OF NORTH DAKOTA	Steam House & Equipment	312 1/2 State St	Grand Forks	$237,900
UNIVERSITY OF NORTH DAKOTA	Steam House & Equipment	492 Tulane Dr	Grand Forks	$237,900
ND HISTORICAL SOCIETY	House	845 88th St SE	Strasburg	$237,600
ND HIGHWAY PATROL	Weigh Station/Scale/Load Cells/Equip	I-94 West	Beach	$270,117
ND FOREST SERVICE	Tree Storage/Cooler (E)	878 Nursery Road	Towner	$293,000

Description	Building Name	Address	City	Insured Amount
ND PARKS AND RECREATION DEPARTMENT	House/Garage	2070-014 1252A 41st Ave NW	Garrison	$236,792
ND PARKS AND RECREATION DEPARTMENT	Historic Dining Hall/Kitchen	2100-001 #2 Lake Metigoshe	Bottineau	$244,293
DOT MTCE & ENG SERVICES/REST AREAS	Edgeley Building	9 Miles North of Edgeley/US 281	Edgeley	$235,700
ND PARKS AND RECREATION DEPARTMENT	House/Garage	2150-001 152 S Duncan Rd	Devils Lake	$238,236
DAKOTA COLLEGE AT BOTTINEAU	Molberg Headhouse/Garage	105 Simrall Blvd	Bottineau	$258,406
DOT MTCE & ENG SERVICES/DICKINSON	Richardton Equipment Building	115 D St S	Richardton	$301,000
ADJUTANT GENERAL, CAMP GRAFTON	Enlisted's Latrine	4417 Hwy 20	Devils Lake	$232,900
ADJUTANT GENERAL, CAMP GRAFTON	Enlisted's Latrine	4417 Hwy 20	Devils Lake	$232,900
ADJUTANT GENERAL, CAMP GRAFTON	Wash Rack Building	4417 Hwy 20	Devils Lake	$231,200
CASSELTON RESEARCH CENTER	Farm Shop Building	15449 37th Street SE	Casselton	$254,006
ND PARKS AND RECREATION DEPARTMENT	Manager's Dwelling/Garage	2050-004 1403 River Rd	Center	$230,571
WILLISTON RESEARCH CENTER	Residence/Attached Garage	14120 Hwy 2	Williston	$233,881
ND STATE FAIR	Restrooms/Showers/Laundry	2005 Burdick Expressway E	Minot	$229,100
NORTH DAKOTA STATE UNIVERSITY	Service & Repair Shop	1802 10th St North	Fargo	$445,825
WILLISTON RESEARCH CENTER	5-Unit Employee Modular Housing	5154 112th Ave NW	Ray	$242,151
ND PARKS AND RECREATION DEPARTMENT	Ranger's House/Garage	2100-034 #2 Lake Metigoshe	Bottineau	$228,395
ADJUTANT GENERAL, OFFICE OF THE	Administrative Building	4701 16th St NW	Garrison	$227,600
NORTH CENTRAL RESEARCH CENTER	Residence/Garage	5400 Hwy 83 South	Minot	$232,114
NDSU AG EXPERIMENT RESEARCH	Vet Science Barn	15th Ave North	Fargo	$267,274
ND PARKS AND RECREATION DEPARTMENT	House/Garage	2080-001 5981 Walt Hjelle Parkway	Fort Ransom	$228,326
BISMARCK STATE COLLEGE	Mechanical Maintenance Storage	1831 Twin City Dr SE	Mandan	$226,500
ADJUTANT GENERAL, CAMP GRAFTON	Access Control Facility	4417 Hwy 20	Devils Lake	$347,419

Description	Building Name	Address	City	Insured Amount
ADJUTANT GENERAL, CAMP GRAFTON	Administration Bldg	4417 Hwy 20	Devils Lake	$226,000
ADJUTANT GENERAL, CAMP GRAFTON	Administration Bldg	4417 Hwy 20	Devils Lake	$226,000
ADJUTANT GENERAL, CAMP GRAFTON	Administration Bldg	4417 Hwy 20	Devils Lake	$226,000
ADJUTANT GENERAL, CAMP GRAFTON	Administration Bldg	4417 Hwy 20	Devils Lake	$226,000
ADJUTANT GENERAL, CAMP GRAFTON	Administration Bldg	4417 Hwy 20	Devils Lake	$226,000
DOT MTCE & ENG SERVICES/BISMARCK	Center Equipment Building	3738 Hwy 25	Center	$290,600
DICKINSON RESEARCH CENTER	Bldg E/Storage Building	1041 State Ave	Dickinson	$337,961
ADJUTANT GENERAL, OFFICE OF THE	Residence	300 Fraine Barracks Loop	Bismarck	$224,900
DOT MTCE & ENG SERVICES/FARGO	Lisbon Equipment Storage/Office	12999 Hwy 27	Lisbon	$289,400
ND RAILROAD MUSEUM	Railroad Museum	3102 37th St NW	Mandan	$225,497
ADJUTANT GENERAL, CAMP GRAFTON	Classroom/Mess hall	8870 Hwy 15	McHenry	$220,800
MINOT STATE UNIVERSITY	Geothermal Building w/Equipment at Moore Hall	500 University Ave W	Minot	$220,064
ND DEPT OF CORRECTIONS & REHABILITATION	Carpenter/Electrical Shop	701 16th Ave SW	Mandan	$404,658
WILLISTON RESEARCH CENTER	Farm Equipment/Seed Storage	14120 Hwy 2	Williston	$215,500
DOT MTCE & ENG SERVICES/REST AREAS	EB Crystal Springs Building	9 Miles West of Crystal Springs	Crystal Springs	$214,900
ND PARKS AND RECREATION DEPARTMENT	Historic Home	2090-011 13571 Hwy 5	Cavalier	$214,200
ADJUTANT GENERAL, CAMP GRAFTON	Storage Building	4417 Hwy 20	Devils Lake	$214,000
ND PARKS AND RECREATION DEPARTMENT	Manager's House/Garage	2110-031 781 42 1/2 Ave NW	Pick City	$213,900
ND HIGHWAY PATROL	Weigh Station/Scale/Load Cells/Equip	Jct I-29 & Hwy 5	Joliette	$248,817
WILLISTON RESEARCH CENTER	Machine Shed I	14120 Hwy 2	Williston	$225,005
ND PARKS AND RECREATION DEPARTMENT	Ranger's House/Garage	2010-016 3850 70th St SE	Wishek	$216,140
ADJUTANT GENERAL, CAMP GRAFTON	Mess hall/Classroom	8870 Hwy 15	McHenry	$212,400
DOT MTCE & ENG SERVICES/REST AREAS	WB Medina Building	7 Miles East of Medina	Medina	$212,192

Description	Building Name	Address	City	Insured Amount
ND GAME AND FISH	Storage Building	403 Dakota Ave	Riverdale	$476,293
NDSU AG EXPERIMENT RESEARCH	Residence	19th Ave North	Fargo	$215,451
DOT MTCE & ENG SERVICES/DICKINSON	Beulah 8 kw Generator	205 Hwy 49 S	Beulah	$244,372
DICKINSON STATE UNIVERSITY	Visitor Dugout	605 13th Ave W	Dickinson	$210,000
ND HIGHWAY PATROL	Vehicle Storage	2300 66th St NE	Bismarck	$209,952
ADJUTANT GENERAL, CAMP GRAFTON	Communication Tower Shelter w/ Generator	4417 Hwy 20	Devils lake	$209,800
ADJUTANT GENERAL, OFFICE OF THE	Generator Screen Wall	3920 31st St NW	Fargo	$693,041
ND GAME AND FISH	Warehouse #1	3320 East Lakeside Road	Jamestown	$209,000
ND GAME AND FISH	Warehouse #2	3320 East Lakeside Road	Jamestown	$209,000
ND STATE HOSPITAL	Implement Building	2536 Circle Dr	Jamestown	$208,900
ND FOREST SERVICE	Packaging Building (D)	3 Miles North of City	Towner	$385,208
ND PARKS AND RECREATION DEPARTMENT	Visitor/Interpretive Center	2070-027 1252 A 41st Ave NW	Garrison	$208,502
ADJUTANT GENERAL, OFFICE OF THE	Storage Building @ Fargo	3909 31st St NW	Fargo	$208,300
WILLISTON RESEARCH CENTER	Machine Shed II	14120 Hwy 2	Williston	$212,681
WILLISTON RESEARCH CENTER	Farm Equipment Storage	5154 112th Ave NW	Ray	$208,000
ND PARKS AND RECREATION DEPARTMENT	FTE Residence	2130-023 4904 119th Rd NW	Epping	$207,900
ADJUTANT GENERAL, OFFICE OF THE	Residence	320 Fraine Barracks Loop	Bismarck	$207,600
ND HIGHWAY PATROL	Weigh Station/Scale/Load Cells/Equip	I-29 9 Miles from SD border	Mooreton	$266,990
DICKINSON RESEARCH CENTER	Bldg G/W Equipment Chemical Strg	1041 State Ave	Dickinson	$219,153
ADJUTANT GENERAL, OFFICE OF THE	Storage Building	4370 E Miriam Ave	Bismarck	$205,800
ND PARKS AND RECREATION DEPARTMENT	Historical Office Building	2040-002 4480 Fort Lincoln Rd	Mandan	$207,745
ND VETERANS HOME	Heating Plant/Generator/Garage	1600 Veterans Dr	Lisbon	$205,640
WILLISTON RESEARCH CENTER	Garage	14120 Hwy 2	Williston	$251,016
ADJUTANT GENERAL, CAMP GRAFTON	Pesticide Mixing/Storage Building	4417 Hwy 20	Devils Lake	$204,000

Description	Building Name	Address	City	Insured Amount
ND PARKS AND RECREATION DEPARTMENT	Manager's House/Garage	2130-012 4904 119th Rd NW	Epping	$203,800
ND PARKS AND RECREATION DEPARTMENT	Shop/Office	2150-002 152 S Duncan Rd	Devils Lake	$229,322
ND PARKS AND RECREATION DEPARTMENT	Restrooms/Showers	2090-047 13571 Hwy 5	Cavalier	$202,600
ADJUTANT GENERAL, CAMP GRAFTON	Canopy @ #158	4417 Hwy 20	Devils Lake	$202,400
ND PARKS AND RECREATION DEPARTMENT	Ranger's House/Garage	2070-005 1252A 41st Ave NW	Garrison	$202,200
DOT MTCE & ENG SERVICES/FARGO	Wyndmere Equipment Storage/Office	7775 Hwy 18	Wyndmere	$268,200
DOT MTCE & ENG SERVICES/GRAND FORKS	Finley Equipment Bldg/Addition	400 Lincoln Ave N	Finley	$200,500
ND HISTORICAL SOCIETY	House/Office	3448 Chateau Road	Medora	$197,800
NDSU AG EXPERIMENT RESEARCH	Short Term Seed Storage	1895 15th Ave N	Fargo	$197,400
ND STATE FAIR	Dairy Barn	2005 Burdick Expressway E	Minot	$232,266
ND VETERANS HOME	Gazebo/Restrooms	1600 Veterans Dr	Lisbon	$208,433
DICKINSON RESEARCH CENTER	Bldg A/Grass Lab	1041 State Ave	Dickinson	$217,767
ND WATER COMMISSION	Dodge Chloramination Facility	NE4 Sec 16-144-91	Dodge	$195,200
DICKINSON RESEARCH CENTER	Old Office Building	1133 State Ave	Dickinson	$202,392
ND PARKS AND RECREATION DEPARTMENT	Historic Cranley Museum	2090-049 13571 Hwy 5	Cavalier	$191,500
DOT MTCE & ENG SERVICES/WILLISTON	Williston Storage Building	605 Dakota Parkway W	Williston	$191,200
ND HISTORICAL SOCIETY	Blockhouse 1 - SW	935 Broadway	Abercrombie	$187,500
ND HISTORICAL SOCIETY	Blockhouse 2 - SE	935 Broadway	Abercrombie	$187,500
ND SCHOOL FOR THE DEAF	Brick Garage	1401 College Dr N	Devils Lake	$272,157
ND GAME AND FISH	Storage Building	225 30th Ave SW	Dickinson	$347,485
ND PARKS AND RECREATION DEPARTMENT	Warming House	2140-016 3084 Park Ave	Arvilla	$180,221
NDSU AG EXPERIMENT RESEARCH	Farm Shop/Office	19th Ave North	Fargo	$221,611

Description	Building Name	Address	City	Insured Amount
ND FOREST SERVICE	Machinery Storage (F)	878 Nursery Road	Towner	$207,300
ND PARKS AND RECREATION DEPARTMENT	Manager's House/Garage	2140-049 3084 Park Ave	Arvilla	$180,017
HETTINGER RESEARCH CENTER	Clement Site Residence	105 1st Ave West	Hettinger	$182,127
NDSU AG EXPERIMENT RESEARCH	Machine Shed II	2830 160th Ave SE	Casselton	$186,717
DOT MTCE & ENG SERVICES/VALLEY CITY	Valley City Salt/Sand Storage	1524 8th Ave SW	Valley City	$188,030
UNIVERSITY OF NORTH DAKOTA	Golf Maintenance Shop	706 South 34th St	Grand Forks	$260,488
NDSU AG EXPERIMENT RESEARCH	Farm Equipment Storage	19th Ave North	Fargo	$174,100
CARRINGTON RESEARCH CENTER	Vehicle Storage/Shop	663 Hwy 281 NE	Carrington	$182,294
ND PARKS AND RECREATION DEPARTMENT	Manager's House	2100-035 #2 Lake Metigoshe	Bottineau	$173,800
HETTINGER RESEARCH CENTER	Shop/Equipment Building	102 1/2 Hwy 12 W	Hettinger	$206,704
ADJUTANT GENERAL, OFFICE OF THE	Fuel Truck Containment Building	2135 7th St SE	Valley CIty	$173,400
CENTRAL GRASSLANDS RESEARCH CENTER	House/Garage @ Streeter	4824 48th Ave SE	Streeter	$173,300
ND HISTORICAL SOCIETY	Garage	571 113 1/2 Ave NE	Cooperstown	$172,000
ND PARKS AND RECREATION DEPARTMENT	Concession/Restroom	2090-046 13571 Hwy 5	Cavalier	$180,858
NDSU AG EXPERIMENT RESEARCH	Residence	19th Ave North	Fargo	$175,551
ADJUTANT GENERAL, CAMP GRAFTON	Target Storage/Repair	8870 Hwy 15	McHenry	$170,500
ND HOUSING FINANCE AGENCY	Single Family w/Detached Garage	1720 29th St W	Williston	$170,057
ND GAME AND FISH	Information Building	2005 Burdick Expy E	Minot	$176,760
ND PARKS AND RECREATION DEPARTMENT	Maintenance Building	2130-002 4904 119th Rd NW	Epping	$180,936
ADJUTANT GENERAL, CAMP GRAFTON	Fuel Truck Containment	4417 Hwy 20	Devils Lake	$167,800
ADJUTANT GENERAL, CAMP GRAFTON	Fuel Truck Containment	4417 Hwy 20	Devils Lake	$167,800
ND PARKS AND RECREATION DEPARTMENT	Maintenance Building	2090-009 13571 Hwy 5	Cavalier	$185,869

Description	Building Name	Address	City	Insured Amount
ND PARKS AND RECREATION DEPARTMENT	Storage Barn	2080-016 5981 Walt Hjelle Parkway	Fort Ransom	$168,041
ND FOREST SERVICE	Dwelling/Garage (M)	3 Miles North of City	Towner	$173,025
DOT MTCE & ENG SERVICES/FARGO	Mayville Equipment Building	511 Hwy 18 NE	Mayville	$234,100
ND PARKS AND RECREATION DEPARTMENT	Concession Building	2070-051 1252A 41st Ave NW	Garrison	$197,361
ND PARKS AND RECREATION DEPARTMENT	Antique Display Bldg	2080-054 5981 Walt Hjelle Parkway	Fort Ransom	$165,700
ND PARKS AND RECREATION DEPARTMENT	Concession/Office	2130-003 4904 119th Rd NW	Epping	$177,890
CENTRAL GRASSLANDS RESEARCH CENTER	Shop Building	4824 48th Ave SE	Streeter	$211,016
ND WATER COMMISSION	Office/Control Center	4226 64th Ave NE	Minnewaukan	$183,133
ADJUTANT GENERAL, CAMP GRAFTON	Storage Building	4417 Hwy 20	Devils Lake	$163,200
ND HISTORICAL SOCIETY	Whitestone WPS Shelter	7310 86th SE	Kulm	$163,125
ND HISTORICAL SOCIETY	Chaplain/Surg/Principal's Qtrs	Cavalry Square	Ft. Totten	$163,000
DOT MTCE & ENG SERVICES/VALLEY CITY	Ellendale Equipment Building	8885 97th St SE	Ellendale	$230,500
DOT MTCE & ENG SERVICES/VALLEY CITY	Gackle Equipment Building	5491 Hwy 56	Gackle	$196,872
ND HIGHWAY PATROL	Storage Garage	503 38th St S	Fargo	$161,200
NORTH DAKOTA STATE UNIVERSITY	Pharmacy Radiation Lab	1336 14th St N	Fargo	$160,500
DOT MTCE & ENG SERVICES/DICKINSON	Halliday Equipment Building	400 3rd Ave SE	Halliday	$160,100
DOT MTCE & ENG SERVICES/DICKINSON	New England Equipment Building	11704 61st St SW	New England	$194,072
DAKOTA COLLEGE AT BOTTINEAU	Pack & Store Building	105 Simrall Blvd	Bottineau	$160,100
BANK OF NORTH DAKOTA	Storage Building	1152 Summit Blvd	Bismarck	$249,140
DOT MTCE & ENG SERVICES/MINOT	Towner Equipment Building	401 Airport Rd	Towner	$227,000
DOT MTCE & ENG SERVICES/MINOT	Garrison Equipment Building	515 Hwy 37 SE	Garrison	$227,000
DOT MTCE & ENG SERVICES/WILLISTON	Bowbells Equipment Building	506 Centennial Dr	Bowbells	$225,200
DOT MTCE & ENG SERVICES/VALLEY CITY	Courtenay Equipment Building	9160 Hwy 20 SE	Courtenay	$191,472

Description	Building Name	Address	City	Insured Amount
ADJUTANT GENERAL, CAMP GRAFTON	Range Control Tower Bldg	8870 Hwy 15	McHenry	$156,400
DOT MTCE & ENG SERVICES/DEVILS LAKE	Fessenden Equipment Building	1570 43rd Ave E	Fessenden	$156,300
ND PARKS AND RECREATION DEPARTMENT	2-Block Houses	2040-004-005 4480 Fort Lincoln Rd	Mandan	$156,200
NORTH DAKOTA STATE UNIVERSITY	Butler Maintenance Building	1516 Centennial Blvd	Fargo	$240,986
ND DEPT OF CORRECTIONS & REHABILITATION	Auto Mechanic Classroom	1800 48th Ave SW	Bismarck	$471,593
CASSELTON RESEARCH CENTER	Machine Shed #2	15449 37th Street SE	Casselton	$159,397
ND PARKS AND RECREATION DEPARTMENT	Dorm Restroom	2100-004 #2 Lake Metigoshe	Bottineau	$154,500
ND STATE FAIR	Beef Barn	2005 Burdick Expressway E	Minot	$156,055
DOT MTCE & ENG SERVICES/FARGO	Lidgerwood Equipment Building	25 4th St SE	Lidgerwood	$221,300
ND PARKS AND RECREATION DEPARTMENT	Solar Restroom	2110-034 781 42 1/2 Ave NW	Pick City	$153,500
NDSU AG EXPERIMENT RESEARCH	Residence	19th Ave North	Fargo	$157,351
NDSU AG EXPERIMENT RESEARCH	Residence	19th Ave North	Fargo	$157,351
CASSELTON RESEARCH CENTER	Storage Building	15449 37th Street SE	Casselton	$154,060
WILLISTON RESEARCH CENTER	Threshing Building	14120 Hwy 2	Williston	$166,644
CENTRAL GRASSLANDS RESEARCH CENTER	Dwelling @ Iszler Farm	4647 47th Ave SE	Streeter	$152,320
DOT MTCE & ENG SERVICES/MINOT	Mohall Equipment Building	802 CO Road 9 N	Mohall	$219,000
OAKES RESEARCH CENTER	Pesticide Handling Facility	Hwy 1 South	Oakes	$151,000
ND PARKS AND RECREATION DEPARTMENT	Historic House	2080-011 5981 Walt Hjelle Parkway	Fort Ransom	$151,000
ND FOREST SERVICE	Shop Building (C)	3 Miles North of City	Towner	$158,800
NDSU AG EXPERIMENT RESEARCH	Residence	19th Ave North	Fargo	$154,451
ND DEPT OF CORRECTIONS & REHABILITATION	MRCC Dayroom/Recreation	1800 48th Ave SW	Bismarck	$150,400

Description	Building Name	Address	City	Insured Amount
DOT MTCE & ENG SERVICES/VALLEY CITY	Litchville Equipment Building	808 First Ave	Litchville	$183,472
DOT MTCE & ENG SERVICES/FARGO	Forman Equipment Building	9106 Hwy 32	Forman	$216,600
ND PARKS AND RECREATION DEPARTMENT	Storage Building	2040-033 4480 Fort Lincoln Rd	Mandan	$150,856
DOT MTCE & ENG SERVICES/VALLEY CITY	Ashley Equipment Building	520 7th St SW	Ashley	$216,000
DOT MTCE & ENG SERVICES/VALLEY CITY	Oakes Equipment Building	914 S 7th St	Oakes	$215,900
CARRINGTON RESEARCH CENTER	Machine Shop	663 Hwy 281 NE	Carrington	$156,594
ND VISION SERVICES	Steam House/Equipment	500 Stanford Rd	Grand Forks	$147,900
DOT MTCE & ENG SERVICES/DEVILS LAKE	Maddock Equipment Building	4902 39th St NE	Maddock	$215,400
ND PARKS AND RECREATION DEPARTMENT	Shop/Storage Building	2150-038 152 S Duncan Rd	Devils Lake	$165,739
CARRINGTON RESEARCH CENTER	Machine Shed II	663 Hwy 281 NE	Carrington	$150,597
ND PARKS AND RECREATION DEPARTMENT	Storage Building	2040-034 4480 Fort Lincoln Rd	Mandan	$146,400
ND PARKS AND RECREATION DEPARTMENT	Restroom/Showers	2130-001 4904 119th Rd NW	Epping	$146,100
ND HISTORICAL SOCIETY	Powder Mag	15349 39th Lane NW	Williston	$143,000
ND PARKS AND RECREATION DEPARTMENT	Maintenance Shop	2080-005 5981 Walt Hjelle Parkway	Fort Ransom	$164,265
ND HOUSING FINANCE AGENCY	Single Family w/ Garage	600 20th St NW	Minot	$143,000
DOT MTCE & ENG SERVICES/GRAND FORKS	Cavalier Equipment Building	9398 138th Ave NE	Cavalier	$209,700
DOT MTCE & ENG SERVICES/GRAND FORKS	Adams Equipment Building	804 1st Ave	Adams	$209,700
CASSELTON RESEARCH CENTER	Seed Stock Storage Building	15449 37th Street SE	Casselton	$142,100
DOT MTCE & ENG SERVICES/DEVILS LAKE	Pekin Equipment Building	205 Main St S	Pekin	$209,100
DOT MTCE & ENG SERVICES/DEVILS LAKE	Starkweather Equipment Building	7171 Hwy 20	Starkweather	$141,300
DICKINSON RESEARCH CENTER	Machine Shed	11090 15th St SW	Manning	$148,859

Description	Building Name	Address	City	Insured Amount
ND GAME AND FISH	Home/Attached Garage	4561 103rd Ave SW	Gladstone	$140,000
ND PARKS AND RECREATION DEPARTMENT	Restrooms/Showers	2150-006 152 S Duncan Rd	Devils Lake	$142,378
ND PARKS AND RECREATION DEPARTMENT	3-Cabins (047-048-049)	2100-047-048-049 #2 Lake Metigoshe	Bottineau	$139,800
ND PARKS AND RECREATION DEPARTMENT	Restrooms/Showers	2080-042 5981 Walt Hjelle Parkway	Fort Ransom	$139,100
CENTRAL GRASSLANDS RESEARCH CENTER	Vacant House/Garage @ Iszler Farm	4647 47th Ave SE	Streeter	$138,252
ND FOREST SERVICE	Equipment/Fire Storage (D)	1037 Forestry Dr	Bottineau	$164,869
WILLISTON RESEARCH CENTER	Shop Building	14120 Hwy 2	Williston	$159,606
DICKINSON RESEARCH CENTER	Bldg D/Shop	1041 State Ave	Dickinson	$170,041
ND STATE COLLEGE OF SCIENCE	Electrical Distribution Building	800 North 6th St	Wahpeton	$134,900
ADJUTANT GENERAL, CAMP GRAFTON	Residence	4417 Hwy 20	Devils Lake	$134,800
ND PARKS AND RECREATION DEPARTMENT	Manager's House	2100-036 #2 Lake Metigoshe	Bottineau	$134,807
ND HEALTH DEPARTMENT	Cold Storage Building	2639 E Main	Bismarck	$225,049
NORTH DAKOTA STATE UNIVERSITY	Greenhouse with Head House	2020 Centennial Blvd	Fargo	$133,400
ND WATER COMMISSION	Round Lake Priming Pump Enclosure	4226 64th Ave NE	Minnewaukan	$133,200
ND ATMOSPHERIC RESOURCE BOARD	Radar Building/Radome	6135 82nd Ave NW	Stanley	$1,307,211
WILLISTON STATE COLLEGE	Concession/Restroom	1410 University Ave	Williston	$159,274
ND PARKS AND RECREATION DEPARTMENT	Concession Building	2110-006 781 42 1/2 Ave NW	Pick City	$136,444
DICKINSON RESEARCH CENTER	Shop/Equipment Storage	11090 15th St SW	Manning	$137,206
ND PARKS AND RECREATION DEPARTMENT	ADA Restroom/Showers	2010-007 3850 70th St SE	Wishek	$132,002
UNIVERSITY OF NORTH DAKOTA	EERC Facility Maintenance	15 N 23rd St	Grand Forks	$188,481
ADJUTANT GENERAL, OFFICE OF THE	Storage	350 Fraine Barracks Dr	Bismarck	$129,700
ND HIGHWAY PATROL	Weigh Station/Scale/Load Cells/Equip	Jct of US 85 & 12	Bowman	$171,685
ND HOUSING FINANCE AGENCY	Single Family w/Detached Garage	504 5th St SW	Minot	$128,497

Description	Building Name	Address	City	Insured Amount
ND GAME AND FISH	Storage Building	225 30th Ave SW	Dickinson	$163,366
ND WATER COMMISSION	Dodge Ammonia Facility	NE4 Sec 16-144-91	Dodge	$126,600
ADJUTANT GENERAL, OFFICE OF THE	Storage Building	4380 E Miriam Ave	Bismarck	$126,000
ND PARKS AND RECREATION DEPARTMENT	Restrooms/Showers	2150-004 152 S Duncan Rd	Devils Lake	$125,500
ND PARKS AND RECREATION DEPARTMENT	Concession Building	2150-030 152 S Duncan Rd	Devils Lake	$136,235
ND PARKS AND RECREATION DEPARTMENT	Maintenance Building	2050-002 1403 River Rd	Center	$130,645
NORTH CENTRAL RESEARCH CENTER	Machine Shed II	5400 Hwy 83 South	Minot	$123,800
ND HIGHWAY PATROL	Weigh Station/Scale/Load Cells/Equip	W of Jct I-29 on I-94	West Fargo	$161,129
ND DEPT OF CORRECTIONS & REHABILITATION	Raw Material Storage	3303 E Main Ave	Bismarck	$351,397
CENTRAL GRASSLANDS RESEARCH CENTER	Machine Shed @ Iszler Farm	4647 47th Ave SE	Streeter	$129,196
ND FOREST SERVICE	Tree Storage/Cooler (B)	3 Miles North of City	Towner	$121,200
DICKINSON RESEARCH CENTER	Farrow Barn	11090 15th St SW	Manning	$121,100
ND PARKS AND RECREATION DEPARTMENT	Restroom	2090-005 13571 Hwy 5	Cavalier	$121,000
CARRINGTON RESEARCH CENTER	Plot Storage Building	663 Hwy 281 NE	Carrington	$125,197
WILLISTON STATE COLLEGE	Auto Parts Warehouse	1410 University Ave	Williston	$168,000
DICKINSON STATE UNIVERSITY	Press Box/Radio/Media Building	605 13th Ave W	Dickinson	$120,000
ND HISTORICAL SOCIETY	Stable	3448 Chateau Road	Medora	$120,000
CARRINGTON RESEARCH CENTER	Hay Shed II	6689 6th St NE	Carrington	$118,800
ND PARKS AND RECREATION DEPARTMENT	Dining Hall	2100-075 #2 Lake Metigoshe	Bottineau	$118,487
ND HISTORICAL SOCIETY	Coachman's House	3448 Chateau Road	Medora	$118,400
WILLISTON RESEARCH CENTER	Pesticide Handling Facility	5154 112th Ave NW	Williston	$118,300
ADJUTANT GENERAL, CAMP GRAFTON	Earth-Covered Magazine #1	4417 Hwy 20	Devils Lake	$118,000
ADJUTANT GENERAL, CAMP GRAFTON	Earth-Covered Magazine #2	4417 Hwy 20	Devils Lake	$118,000

Description	Building Name	Address	City	Insured Amount
ADJUTANT GENERAL, CAMP GRAFTON	Earth-Covered Magazine #3	4417 Hwy 20	Devils Lake	$118,000
NORTH DAKOTA STATE UNIVERSITY	Concession/Restrooms	1605 16th Ave N	Fargo	$116,400
LIFE SKILLS & TRANSITION CENTER	Industrial Park Building	701 West 6th St	Grafton	$130,555
ADJUTANT GENERAL, CAMP GRAFTON	Administration Bldg	4417 Hwy 20	Devils Lake	$115,100
ADJUTANT GENERAL, CAMP GRAFTON	Administration Bldg	4417 Hwy 20	Devils Lake	$115,100
ADJUTANT GENERAL, CAMP GRAFTON	Administration Bldg	4417 Hwy 20	Devils Lake	$115,100
ADJUTANT GENERAL, CAMP GRAFTON	Administration Building	4417 Hwy 20	Devils Lake	$115,100
ADJUTANT GENERAL, CAMP GRAFTON	Administration Building	4417 Hwy 20	Devils Lake	$115,100
ND PARKS AND RECREATION DEPARTMENT	Truck Garage	2040-021 4480 Fort Lincoln Rd	Mandan	$114,972
ND DEPT OF CORRECTIONS & REHABILITATION	Vocational Ed/Weight Room	1800 48th Ave SW	Bismarck	$238,176
BISMARCK COMMUNITY BOWL	2-North Ticket Kiosks	1701 Canary Ave	Bismarck	$114,400
ADJUTANT GENERAL, OFFICE OF THE	Fuel Truck Containment Area	2023 4th St N	Wahpeton	$114,200
ND VETERANS HOME	Storage/Shop Building	1600 Veterans Dr	Lisbon	$189,197
ND PARKS AND RECREATION DEPARTMENT	Historic Barn	2090-012 13571 Hwy 5	Cavalier	$112,700
ATTORNEY GENERAL, OFFICE OF THE	BCI Garage	3416 N Broadway	Minot	$111,200
ADJUTANT GENERAL, CAMP GRAFTON	Range Control Tower	8870 Hwy 15	McHenry	$110,000
ND PARKS AND RECREATION DEPARTMENT	Restroom	2010-013 3850 70th St SE	Wishek	$109,200
ND HOUSING FINANCE AGENCY	Single Family Dwelling w Garage	9 3rd St NW	Hazen	$109,086
HETTINGER RESEARCH CENTER	Clement Site Barn	105 1st Ave West	Hettinger	$113,390
NORTH DAKOTA STATE UNIVERSITY	Bus Stop Shelter	1337 Administration Ave	Fargo	$108,400
NDSU AG EXPERIMENT RESEARCH	Chemical Storage	2830 160th Ave SE	Casselton	$161,413
ND STATE FAIR	Shop #1	2005 Burdick Expressway E	Minot	$163,244
ND VETERANS HOME	Storage Building	1600 Veterans Dr	Lisbon	$178,572
DICKINSON RESEARCH CENTER	Calving Barn	11090 15th St SW	Manning	$107,100

Description	Building Name	Address	City	Insured Amount
ND STATE FAIR	Morton Shop	2005 Burdick Expressway E	Minot	$126,835
ND PARKS AND RECREATION DEPARTMENT	Shower house/Laundry	2510-028 990 Hwy 22 North	Killdeer	$109,207
ND PARKS AND RECREATION DEPARTMENT	Restroom/Showers	2100-019 #2 Lake Metigoshe	Bottineau	$105,200
ADJUTANT GENERAL, CAMP GRAFTON	Residence	4417 Hwy 20	Devils Lake	$104,800
NDSU AG EXPERIMENT RESEARCH	NW22 Plot Storage Building	5 Miles N on Cass Co Hwy 20	Fargo	$110,754
ND PARKS AND RECREATION DEPARTMENT	792 Sq Ft Cabin	2130-017 4904 119th Rd NW	Epping	$104,821
ADJUTANT GENERAL, CAMP GRAFTON	Quarters	4417 Hwy 20	Devils Lake	$103,800
CASSELTON RESEARCH CENTER	Machine Shed #2	15449 37th Street SE	Casselton	$105,399
ND DEPT OF TRUST LANDS	Machine Shed	Sec 32-144-68	Woodworth	$103,017
ND HOUSING FINANCE AGENCY	Single Family w/Detached Garage	220 B St N	Bismarck	$102,900
ADJUTANT GENERAL, OFFICE OF THE	Wash Rack Shelter	3420 2nd St NE	Minot	$102,700
ADJUTANT GENERAL, OFFICE OF THE	Storage	270 Fraine Barracks Lane	Bismarck	$102,000
HETTINGER RESEARCH CENTER	Clement Site Storage Bldg	105 1st Ave West	Hettinger	$117,236
ND PARKS AND RECREATION DEPARTMENT	Historic House/Garage	2140-003 3084 Park Ave	Arvilla	$100,463
CENTRAL GRASSLANDS RESEARCH CENTER	Cattle Working Facility	4824 48th Ave SE	Streeter	$122,394
ADJUTANT GENERAL, CAMP GRAFTON	CGS-Bathhouse	4417 Hwy 20	Devils Lake	$100,000
DOT MTCE & ENG SERVICES/DICKINSON	Dickinson Cold Storage	1700 3rd Ave W Ste 101	Dickinson	$99,840
NDSU AG EXPERIMENT RESEARCH	Hay Storage Building I	19th Ave North	Fargo	$99,100
DOT MTCE & ENG SERVICES/RADIO	476 sq. ft. Marmarth Radio Bldg	8809 172 Ave SW	Marmarth	$98,794
ND PARKS AND RECREATION DEPARTMENT	Auditorium/Office	2100-025 #2 Lake Metigoshe	Bottineau	$116,417
NDSU AG EXPERIMENT RESEARCH	Grain/Machine Storage	19th Ave North	Fargo	$98,200

Description	Building Name	Address	City	Insured Amount
ND PARKS AND RECREATION DEPARTMENT	Historic Triple Shelter	2040-012 4480 Fort Lincoln Rd	Mandan	$97,776
ADJUTANT GENERAL, CAMP GRAFTON	Range Control Tower	8870 Hwy 15	McHenry	$97,700
CENTRAL GRASSLANDS RESEARCH CENTER	Hospital Barn	4824 48th Ave SE	Streeter	$98,899
MAYVILLE STATE UNIVERSITY	Athletic Storage Building	Stan Dakken Dr	Mayville	$100,364
NDSU AG EXPERIMENT RESEARCH	Swine Isolation Barn	19th Ave North	Fargo	$94,600
ND PARKS AND RECREATION DEPARTMENT	Staff Home	2150-017 152 S Duncan Rd	Devils Lake	$95,631
UNIVERSITY OF NORTH DAKOTA	EERC Storage Building	15 N 23rd St	Grand Forks	$135,706
NORTH CENTRAL RESEARCH CENTER	Shop	5400 Hwy 83 South	Minot	$104,505
NDSU AG EXPERIMENT RESEARCH	Hay Storage Shed II	3317 19th Ave North	Fargo	$92,700
NDSU AG EXPERIMENT RESEARCH	Sugar Beet Machine Building	15th Ave North	Fargo	$99,254
ND PARKS AND RECREATION DEPARTMENT	2-Shelters	2510-003-006 990 Hwy 22 North	Killdeer	$92,400
ND PARKS AND RECREATION DEPARTMENT	Restroom	2100-028 #2 Lake Metigoshe	Bottineau	$92,300
ND HISTORICAL SOCIETY	Garage/Shop	3448 Chateau Road	Medora	$92,200
ND PARKS AND RECREATION DEPARTMENT	Restroom	2100-030 #2 Lake Metigoshe	Bottineau	$92,307
ND HISTORICAL SOCIETY	Ft Clark Garage	1150 37th St SW	Center	$92,000
ADJUTANT GENERAL, OFFICE OF THE	Propane Tank Screen Wall	3420 2nd St NE	Minot	$91,800
ND HISTORICAL SOCIETY	WPA Shelter	Double Ditch	Bismarck	$91,750
VALLEY CITY STATE UNIVERSITY	President's Garage	159 Viking Dr	Valley City	$91,476
NORTH DAKOTA STATE UNIVERSITY	Physical Plant Storage	2063 15th Ave N	Fargo	$212,400
ADJUTANT GENERAL, OFFICE OF THE	Wash Rack Building	2013 4th St N	Wahpeton	$90,200
ND PARKS AND RECREATION DEPARTMENT	Ranger's House/Garage	2110-003 781 42 1/2 Ave NW	Pick City	$89,808

Description	Building Name	Address	City	Insured Amount
BISMARCK STATE COLLEGE	NECE Generator Bldg/Interior Items	1200 Schafer St	Bismarck	$92,107
NORTH DAKOTA STATE UNIVERSITY	Press Box	1700 17th Ave N	Fargo	$300,203
ND PARKS AND RECREATION DEPARTMENT	Shower house	2530-005 14651 36th St	Medora	$89,200
MAYVILLE STATE UNIVERSITY	Sports Complex Rest Room	Stan Dakken Dr	Mayville	$90,403
ND PARKS AND RECREATION DEPARTMENT	Historic Memorial Shelter	2140-001 3084 Park Ave	Arvilla	$88,800
ND HISTORICAL SOCIETY	French Gratitude Boxcar Shelter	612 East Blvd Ave	Bismarck	$96,239
ADJUTANT GENERAL, OFFICE OF THE	Storage Building	1501 Hwy 281 N	Jamestown	$88,300
DOT MTCE & ENG SERVICES/GRAND FORKS	Aneta Equipment Building	125 7th St N	Aneta	$88,253
ND PARKS AND RECREATION DEPARTMENT	2-Park Shelters	2510-016-017 990 Hwy 22 North	Killdeer	$88,200
ND PARKS AND RECREATION DEPARTMENT	Park Shelter	2110-017 781 42 1/2 Ave NW	Pick City	$88,200
ND STATE HOSPITAL	Engineering Warehouse	2530 Circle Dr	Jamestown	$141,903
ND DEPT OF CORRECTIONS & REHABILITATION	40'x40' Maintenance Shop	2521 Circle Drive	Jamestown	$157,867
ADJUTANT GENERAL, CAMP GRAFTON	Target Storage	8870 Hwy 15	McHenry	$87,400
BISMARCK STATE COLLEGE	Mandan Lineworker Classroom	3201 Nygren Dr	Mandan	$243,051
UNIVERSITY OF NORTH DAKOTA	Biology Storage Building	3791 Campus Road	Grand Forks	$86,900
BISMARCK STATE COLLEGE	8-Stall Garage	1200 College Ave	Bismarck	$85,800
ADJUTANT GENERAL, CAMP GRAFTON	Target Storage/Repair	8870 Hwy 15	McHenry	$85,500
WILLISTON RESEARCH CENTER	Pesticide Handling Facility	14120 Hwy 2	Williston	$87,223
ND HISTORICAL SOCIETY	Chimney Park Restroom	3448 Chateau Road	Medora	$85,000
NDSU AG EXPERIMENT RESEARCH	Machine Shop	West of Prosper	Prosper	$135,499
ND PARKS AND RECREATION DEPARTMENT	Seasonal Dwelling	2070-012 1252A 41st Ave NW	Garrison	$85,010
UNIVERSITY OF NORTH DAKOTA	EERC Compressor Building	15 N 23rd St	Grand Forks	$260,711

Description	Building Name	Address	City	Insured Amount
ND STATE HOSPITAL	Greenhouse	2605 Circle Dr	Jamestown	$91,971
CARRINGTON RESEARCH CENTER	Livestock Beef Barn	663 Hwy 281 NE	Carrington	$113,300
ND HISTORICAL SOCIETY	Shop Building	Cavalry Square	Ft. Totten	$83,000
NORTH DAKOTA STATE UNIVERSITY	Facilities Management Storage	1230 Bolley Dr	Fargo	$99,891
ND PARKS AND RECREATION DEPARTMENT	Restroom	2110-005 781 42 1/2 Ave NW	Pick City	$82,700
ND PARKS AND RECREATION DEPARTMENT	Maintenance Building	2140-029 3084 Park Ave	Arvilla	$94,224
LAKE REGION STATE COLLEGE	Practice Building	1801 College Dr N	Devils Lake	$169,350
ND HOUSING FINANCE AGENCY	Single Family w/Detached Garage	316 N 2nd St	New Salem	$82,000
NDSU AG EXPERIMENT RESEARCH	Weed Science Storage II	4306 40th Ave NW	Fargo	$81,600
NDSU AG EXPERIMENT RESEARCH	Animal Research Bldg II	15th Ave North	Fargo	$80,700
ND RAILROAD MUSEUM	Depot Building	3102 37th St NW	Mandan	$82,000
ND FOREST SERVICE	Equipment/Chemical Storage (B)	Forestry Drive	Bottineau	$90,996
ND PARKS AND RECREATION DEPARTMENT	Restroom	2110-027 781 42 1/2 Ave NW	Pick City	$80,000
CENTRAL GRASSLANDS RESEARCH CENTER	Pole Storage Building	4824 48th Ave SE	Streeter	$79,400
ND PARKS AND RECREATION DEPARTMENT	Maintenance Building	2010-015 3850 70th St SE	Wishek	$89,978
ND PARKS AND RECREATION DEPARTMENT	Maintenance Building	2110-028 781 42 1/2 Ave NW	Pick City	$86,242
NDSU AG EXPERIMENT RESEARCH	Hey Shed III	33301 19th Ave N.	Fargo	$78,754
ND DEPT OF CORRECTIONS & REHABILITATION	Library	1800 48th Ave SW	Bismarck	$201,237
ND PARKS AND RECREATION DEPARTMENT	Historic Block House	2040-005 4480 Fort Lincoln Rd	Mandan	$78,336
DOT MTCE & ENG SERVICES/RADIO	336 sq. ft. W Fargo Radio Bldg	1915 Main Ave W - 400' tower	West Fargo	$304,588
ADJUTANT GENERAL, CAMP GRAFTON	Vehicle Wash Rack	4417 Hwy 20	Devils Lake	$77,600

Description	Building Name	Address	City	Insured Amount
ADJUTANT GENERAL, CAMP GRAFTON	Vehicle Wash Rack	4417 Hwy 20	Devils Lake	$77,600
VALLEY CITY STATE UNIVERSITY	Storage for Athletic Department-Equipment	1001 Viking Drive SW	Valley City	$112,404
ND STATE FAIR	Kiddies Barn	2005 Burdick Expressway E	Minot	$80,269
NDSU AG EXPERIMENT RESEARCH	Equipment Storage	15th Ave North	Fargo	$77,400
ND PARKS AND RECREATION DEPARTMENT	2-Shelters	2110-024-025 781 42 1/2 Ave NW	Pick City	$77,000
DICKINSON RESEARCH CENTER	Bldg C/Seed House	1041 State Ave	Dickinson	$161,849
ADJUTANT GENERAL, OFFICE OF THE	Vehicle Wash Rack	1515 S 48th St	Grand Forks	$76,700
DOT MTCE & ENG SERVICES/RADIO	384 sq. ft. Blaisdell Radio Bldg	6870 62nd Ave SW - 300' Tower	Blaisdell	$180,618
DOT MTCE & ENG SERVICES/RADIO	384 sq. ft. Bowman Radio Bldg	8557 147th Ave SW - 300' tower	Bowman	$180,618
DOT MTCE & ENG SERVICES/RADIO	384 sq. ft. Merricourt Radio Bldg	7300 83rd St SE - 300' tower	Merricourt	$180,618
DOT MTCE & ENG SERVICES/RADIO	384 sq. ft. Minot Radio Bldg	1521 54th Ave SW - 300' tower	Minot	$180,618
DOT MTCE & ENG SERVICES/RADIO	384 sq. ft. New Salem Radio Bldg	4325 45th Ave - 200' tower	New Salem	$157,020
DOT MTCE & ENG SERVICES/RADIO	384 sq. ft. Raleigh Radio Bldg	4195 76th St - 200' tower	Raleigh	$157,020
DOT MTCE & ENG SERVICES/RADIO	384 sq. ft. Ryder Radio Bldg	28301 184th St SW - 300' tower	Ryder	$180,618
DOT MTCE & ENG SERVICES/RADIO	384 sq. ft. Sentinel Butte Radio Bldg	150 1st Ave SE - 200' tower	Beach	$157,020
DOT MTCE & ENG SERVICES/RADIO	384 sq. ft. Hillsboro Radio Bldg	590 6th St NW - 180' tower	Hillsboro	$140,292
DOT MTCE & ENG SERVICES/RADIO	384 sq. ft. Westfield Radio Bldg	9650 7th Ave SE - 180' tower	Westfield	$140,292
ND HISTORICAL SOCIETY	WPA Entrance/Attached Retaining Wall	3448 Chateau Road	Medora	$76,000
ND PARKS AND RECREATION DEPARTMENT	792 Sq Ft Cabin	2050-182 1403 River Rd	Center	$76,000
NDSU AG EXPERIMENT RESEARCH	Machine Shop	14850 29th St SE	Amenia	$105,361
ADJUTANT GENERAL, CAMP GRAFTON	Urban Defense Building	4417 Hwy 20	Devils Lake	$75,000
DOT MTCE & ENG SERVICES/RADIO	384 sq. ft. Mohall Radio Bldg	4549 Hwy 5 - 180' tower	Mohall	$138,714
CARRINGTON RESEARCH CENTER	Hay Shed III	6689 6th St NE	Carrington	$74,900
BISMARCK STATE COLLEGE	Maintenance Storage	1613 Edwards Ave	Bismarck	$197,509

Description	Building Name	Address	City	Insured Amount
DICKINSON RESEARCH CENTER	Hay Shed	11090 15th St SW	Manning	$74,300
DOT MTCE & ENG SERVICES/RADIO	384 sq. ft. Carrington Radio Building	450 58th Ave SE - 200' tower	Carrington	$154,653
DOT MTCE & ENG SERVICES/RADIO	384 sq. ft. Cleveland Radio Bldg	3229 64R Ave SE - 200' tower	Windsor	$154,653
DOT MTCE & ENG SERVICES/RADIO	384 sq. ft. Butte Radio Bldg	2791 8th Ave NW - 200' tower	Butte	$154,653
DOT MTCE & ENG SERVICES/RADIO	384 sq. ft. Driscoll Radio Bldg	1855 29 St SE - 200' tower	Driscoll	$154,653
DOT MTCE & ENG SERVICES/RADIO	384 sq. ft. Finley Radio Bldg	400 Lincoln Ave - 200' tower	Finley	$154,653
DOT MTCE & ENG SERVICES/RADIO	384 sq. ft. Fortuna Radio Bldg	9671 140th Ave NW - 200' tower	Fortuna	$154,653
DOT MTCE & ENG SERVICES/RADIO	384 sq. ft. Hannaford Radio Bldg	10951 6th St SE - 200' tower	Hannaford	$154,653
DOT MTCE & ENG SERVICES/RADIO	384 sq. ft. Mott Radio Bldg	NE4 Sec 21-132-95 - 200' tower	Mott	$154,653
DOT MTCE & ENG SERVICES/RADIO	384 sq. ft. Wahpeton Radio Bldg	7930 180th Ave SE - 100' tower	Wahpeton	$122,928
DOT MTCE & ENG SERVICES/RADIO	384 sq. ft. Beach P. C. Radio Bldg	ND 16 10 M S of Jct ND 68 - 50' tower	Beach	$93,199
DOT MTCE & ENG SERVICES/RADIO	384 sq. ft. Esmond Radio Bldg	4190 Hwy 3 South - 180' tower	Esmond	$137,925
NDSU AG EXPERIMENT RESEARCH	Plot Storage Building	15th Ave North	Fargo	$80,754
ND HIGHWAY PATROL	Panger Weigh Scale Building	4391 Highway 85 N	Alexander	$103,900
DOT MTCE & ENG SERVICES/RADIO	384 sq. ft. Bottineau Radio Bldg	10605 Sjule Road - 200' Tower	Bottineau	$153,864
DOT MTCE & ENG SERVICES/RADIO	384 sq. ft. Cayuga Radio Bldg	10188 138th Ave SE - 300' tower	Havanna	$177,462
DOT MTCE & ENG SERVICES/RADIO	384 sq. ft. Columbus Radio Bldg	8934 Hwy 40 - 300' tower	Powers Lake	$177,462
DOT MTCE & ENG SERVICES/RADIO	384 sq. ft. Hannover Radio Bldg	1575 Hwy 31 - 300' tower	Hannover	$177,462
DOT MTCE & ENG SERVICES/RADIO	384 sq. ft. Killdeer Radio Bldg	SE 4 Sec 34-147-96 - 200' tower	Killdeer	$153,864
DOT MTCE & ENG SERVICES/RADIO	384 sq. ft. Mylo Radio Bldg	4681 87th St NE - 300' tower	Mylo	$177,462
DOT MTCE & ENG SERVICES/RADIO	384 sq. ft. Petersburg Radio Bldg	4014 123rd Ave NE - 200' tower	Petersburg	$153,864
DOT MTCE & ENG SERVICES/RADIO	384 sq. ft. Wishek Radio Bldg	8045 Hwy 3 SE - 200' tower	Wishek	$153,864
DOT MTCE & ENG SERVICES/RADIO	384 sq. ft. Wales Radio Bldg	9203 Co Road 17 - 180' tower	Wales	$136,499
NDSU AG EXPERIMENT RESEARCH	Vet Isolation Barn	15th Ave North	Fargo	$93,345
ND HISTORICAL SOCIETY	Carriage	3448 Chateau Road	Medora	$73,000

Description	Building Name	Address	City	Insured Amount
HETTINGER RESEARCH CENTER	Hay Shelter	102 1/2 Hwy 12 W	Hettinger	$72,900
ND HOUSING FINANCE AGENCY	Single Family Dwelling	123 Church St	Ray	$72,840
CENTRAL GRASSLANDS RESEARCH CENTER	Cattle Barn	4824 48th Ave SE	Streeter	$72,300
ADJUTANT GENERAL, CAMP GRAFTON	Officer's Latrine	4417 Hwy 20	Devils Lake	$72,200
ADJUTANT GENERAL, CAMP GRAFTON	Officer's Latrine	4417 Hwy 20	Devils Lake	$72,200
ND PARKS AND RECREATION DEPARTMENT	Maintenance Shop	2100-069 #2 Lake Metigoshe	Bottineau	$71,600
ND HISTORICAL SOCIETY	Storage Building	2301 University Dr/Bldg #4	Bismarck	$71,300
NORTH DAKOTA STATE UNIVERSITY	Agricultural Quonset	1523 13th Ave N	Fargo	$81,290
ND PARKS AND RECREATION DEPARTMENT	Storage Building	2110-001 781 42 1/2 Ave NW	Pick City	$77,750
NDSU AG EXPERIMENT RESEARCH	Plot Storage Building	15th Ave North	Fargo	$77,254
DOT MTCE & ENG SERVICES/DICKINSON	Dickinson Material Storage	1700 3rd Ave W Ste 101	Dickinson	$70,400
CARRINGTON RESEARCH CENTER	Beef Research Office	663 Hwy 281 NE	Carrington	$72,740
ND PARKS AND RECREATION DEPARTMENT	Concession/Marina	2070-025 1252A 41st Ave NW	Garrison	$74,288
ND RAILROAD MUSEUM	Display/Storage Building	3102 37th St NW	Mandan	$73,000
VALLEY CITY STATE UNIVERSITY	Gazebo	College St SW	Valley City	$70,000
ND PARKS AND RECREATION DEPARTMENT	Centennial Log Cabin	2050-006 1403 River Rd	Center	$70,592
ADJUTANT GENERAL, CAMP GRAFTON	Steel Canopy @ #166	4417 Hwy 20	Devils Lake	$69,300
NDSU AG EXPERIMENT RESEARCH	Garage/Lab	14850 29th St SE	Amenia	$78,059
ND PARKS AND RECREATION DEPARTMENT	Concession Stand	4480 Fort Lincoln Rd	Mandan	$68,800
ND PARKS AND RECREATION DEPARTMENT	Ranger's House	2100-003 #2 Lake Metigoshe	Bottineau	$69,344
NORTH DAKOTA STATE UNIVERSITY	2-Restrooms	1200 University Dr N	Fargo	$68,400
ND FOREST SERVICE	Tree Storage/Cooler Building	101 5th St	Walhalla	$76,830

Description	Building Name	Address	City	Insured Amount
HETTINGER RESEARCH CENTER	Chemical Storage Building	102 1/2 Hwy 12 W	Hettinger	$104,682
ND GAME AND FISH	Dwelling	7 Miles W/1 Mile N Hwy 43	St John	$70,536
NDSU AG EXPERIMENT RESEARCH	Plot Storage Building	15th Ave North	Fargo	$98,061
ADJUTANT GENERAL, OFFICE OF THE	Vehicle Wash Rack	3917 31st St NW	Fargo	$67,000
NDSU AG EXPERIMENT RESEARCH	Maintenance/Storage Building	Hwy 1804 South	Mandan	$87,045
ND SCHOOL FOR THE DEAF	Dairy Barn Storage	1401 College Dr N	Devils Lake	$68,392
ND FOREST SERVICE	Pesticide Building (G)	3 Miles North of City	Towner	$84,300
ND PARKS AND RECREATION DEPARTMENT	Entrance Station	2010-004 3850 70th St SE	Wishek	$65,403
ND PARKS AND RECREATION DEPARTMENT	600 Sq Ft Cabin/Office	2510-013 990 Hwy 22 North	Killdeer	$69,213
NORTH CENTRAL RESEARCH CENTER	Pesticide Handling Facility	5400 Hwy 83 South	Minot	$64,600
ND PARKS AND RECREATION DEPARTMENT	600 Sq Ft Cabin/Office	2530-001 14651 36th St	Medora	$68,713
ADJUTANT GENERAL, CAMP GRAFTON	Garage	4417 Hwy 20	Devils Lake	$64,100
ND HISTORICAL SOCIETY	Guardhouse	935 Broadway	Abercrombie	$63,750
ND PARKS AND RECREATION DEPARTMENT	Storage Building	2080-003 5981 Walt Hjelle Parkway	Fort Ransom	$63,100
ND FOREST SERVICE	N Cold Storage Building (E)	Forestry Drive	Bottineau	$62,493
NORTH DAKOTA STATE UNIVERSITY	Longwell Building	1522 Centennial Blvd	Fargo	$85,518
MINOT STATE UNIVERSITY	Amphitheater Projection/Restrooms	500 University Ave W	Minot	$62,300
ADJUTANT GENERAL, OFFICE OF THE	Vehicle Wash Rack	4350 E Miriam Ave	Bismarck	$62,300
ND GAME AND FISH	Cold Storage	100 N Bismarck Expressway	Bismarck	$62,200
MINOT STATE UNIVERSITY	Greenhouse at Moore Hall	500 University Ave W	Minot	$62,000
ND PARKS AND RECREATION DEPARTMENT	Concession Building	2140-007 3084 Park Ave	Arvilla	$61,620
DICKINSON RESEARCH CENTER	Equipment Storage Building	11533 34th St SW	Dickinson	$67,576
ND GAME AND FISH	Storage Building	3320 East Lakeside Road	Jamestown	$65,246

Description	Building Name	Address	City	Insured Amount
MAYVILLE STATE UNIVERSITY	Baseball Concession/Pressbox	Stan Dakken Dr	Mayville	$77,616
MAYVILLE STATE UNIVERSITY	Coal House/Garage	Third St NE	Mayville	$62,708
ND DEPT OF CORRECTIONS & REHABILITATION	MRCC Welding Trailer	1800 48th Ave SW	Bismarck	$60,057
ND RAILROAD MUSEUM	Red Storage Building	3102 37th St NW	Mandan	$63,000
ADJUTANT GENERAL, CAMP GRAFTON	Fuel Facility Building	4417 Hwy 20	Devils Lake	$60,000
ND FOREST SERVICE	Cooler Building (A)	3 Miles North of City	Towner	$68,600
DOT MTCE & ENG SERVICES/MINOT	Minot Equipment Building	1305 Hwy 2 Bypass E	Minot	$59,200
NDSU AG EXPERIMENT RESEARCH	Plot Storage Building	15th Ave North	Fargo	$65,254
ND PARKS AND RECREATION DEPARTMENT	Restroom	2070-016 1252A 41st Ave NW	Garrison	$58,500
ADJUTANT GENERAL, OFFICE OF THE	Garage	365 Fraine Barracks Loop	Bismarck	$58,100
ADJUTANT GENERAL, OFFICE OF THE	Pump House & Pump	1825 46th St	Mandan	$58,000
MAYVILLE STATE UNIVERSITY	Child Development Storage Bldg	Stan Dakken Dr	Mayville	$76,399
ND GAME AND FISH	Storage Building	9 Miles S on Hwy 32/2.5 Miles E	Walhalla	$57,476
ND PARKS AND RECREATION DEPARTMENT	Amphitheater	13571 Highway 5	Cavalier	$56,595
ND PARKS AND RECREATION DEPARTMENT	Ranger's House	2140-008 3084 Park Ave	Arvilla	$56,448
NDSU AG EXPERIMENT RESEARCH	Four Bay Feed Storage	19th Ave North	Fargo	$56,400
NDSU AG EXPERIMENT RESEARCH	Plot Storage Building	15th Ave North	Fargo	$63,054
UNIVERSITY OF NORTH DAKOTA	Electric Meter Bldg	3885 Campus Road	Grand Forks	$70,200
ND PARKS AND RECREATION DEPARTMENT	3-392 Sq Ft Cabins	2140-009-010-011 3084 Park Ave	Arvilla	$55,539
ND FOREST SERVICE	Storage Building	Hwy 32 South	Lisbon	$55,300
NORTH DAKOTA STATE UNIVERSITY	Enclosed Bus Stop	Albrecht Blvd & 17th Ave N	Fargo	$55,300
NDSU AG EXPERIMENT RESEARCH	Plot Storage Building	15th Ave North	Fargo	$61,554
OAKES RESEARCH CENTER	Storage Building	Hwy 1 South	Oakes	$54,800

Description	Building Name	Address	City	Insured Amount
ND DEPT OF CORRECTIONS & REHABILITATION	Pump House/Equipment	1800 48th Ave SW	Bismarck	$54,800
CENTRAL GRASSLANDS RESEARCH CENTER	Machine Shed	4824 48th Ave SE	Streeter	$58,697
ND PARKS AND RECREATION DEPARTMENT	Storage Building	2110-004 781 42 1/2 Ave NW	Pick City	$54,400
LANGDON RESEARCH CENTER	Pesticide Handling Facility	9280 107th Ave NE	Langdon	$68,310
NDSU AG EXPERIMENT RESEARCH	Plot Storage Building	15th Ave North	Fargo	$60,554
ND PARKS AND RECREATION DEPARTMENT	Ranger's Garage	2090-056 13571 Hwy 5	Cavalier	$53,800
ND FOREST SERVICE	Irrigation Building (L)	3 Miles North of City	Towner	$56,700
UNIVERSITY OF NORTH DAKOTA	EERC HPT Facility Support	15 N 23rd St	Grand Forks	$59,300
NDSU AG EXPERIMENT RESEARCH	Plot Storage Building	15th Ave North	Fargo	$59,254
NDSU AG EXPERIMENT RESEARCH	Plot Storage Building	15th Ave North	Fargo	$59,254
NDSU AG EXPERIMENT RESEARCH	Plot Storage Building	15th Ave North	Fargo	$59,254
NDSU AG EXPERIMENT RESEARCH	Plot Storage Building	15th Ave North	Fargo	$58,954
NDSU AG EXPERIMENT RESEARCH	Plot Storage Building	15th Ave North	Fargo	$58,454
NDSU AG EXPERIMENT RESEARCH	Plot Storage Building	15th Ave North	Fargo	$58,454
ND HISTORICAL SOCIETY	WPA Shelter		Menoken	$51,750
NDSU AG EXPERIMENT RESEARCH	Ram Barn	19th Ave North	Fargo	$51,400
ND DEPT OF HUMAN SERVICES	SEHSC Storage Building @ Fargo	2624 9th Ave S	Fargo	$103,090
ND PARKS AND RECREATION DEPARTMENT	Enclosed Shelter	2040-041 4480 Fort Lincoln Rd	Mandan	$51,000
CENTRAL GRASSLANDS RESEARCH CENTER	Equipment Storage Shed B	4824 48th Ave SE	Streeter	$51,000
ADJUTANT GENERAL, OFFICE OF THE	5-Stall Garage	370 Fraine Barracks Dr	Bismarck	$50,800
HETTINGER RESEARCH CENTER	Agronomy Lab	102 1/2 Hwy 12 W	Hettinger	$125,359

Description	Building Name	Address	City	Insured Amount
NORTH CENTRAL RESEARCH CENTER	Storage Building	5400 Hwy 83 South	Minot	$50,500
UNIVERSITY OF NORTH DAKOTA	2-Double Entrance Bus Shelters	University & State/Cornell & 2nd	Grand Forks	$50,400
DOT MTCE & ENG SERVICES/GRAND FORKS	Grand Forks Engineers Storage	1951 N Washington	Grand Forks	$50,286
ND FOREST SERVICE	Seed Cooler Building (U)	878 Nursery Road	Towner	$165,100
ND FOREST SERVICE	Shop Building	101 5th St	Walhalla	$58,386
DICKINSON RESEARCH CENTER	Director Residence Garage	1085 State Street	Dickinson	$50,000
ND PARKS AND RECREATION DEPARTMENT	Cold Storage Building	4904 119th Rd NW	Epping	$49,994
ND STATE FAIR	Shop #2	2005 Burdick Expressway E	Minot	$91,171
ADJUTANT GENERAL, CAMP GRAFTON	3-Metal Buildings	4417 Hwy 20	Devils Lake	$49,005
ND DEPT OF CORRECTIONS & REHABILITATION	Five Stall Garage	701 16th Ave SW	Mandan	$49,000
LIFE SKILLS & TRANSITION CENTER	Pedestrian Tunnel Shelter	701 West 6th St	Grafton	$48,700
ND GAME AND FISH	Storage Building	1851 23rd Ave NE	Harvey	$100,096
NORTH DAKOTA STATE UNIVERSITY	S Softball Dugout/Storage Area	1750 17th Ave N	Fargo	$48,200
ND PARKS AND RECREATION DEPARTMENT	Slemmens Lodge	2100-076 #2 Lake Metigoshe	Bottineau	$48,195
ND PARKS AND RECREATION DEPARTMENT	Pringle Lodge	2100-073 #2 Lake Metigoshe	Bottineau	$48,035
ND PARKS AND RECREATION DEPARTMENT	Employee Cabin	2100-002 #2 Lake Metigoshe	Bottineau	$48,127
ND PARKS AND RECREATION DEPARTMENT	Loon Cabin	2100-071 #2 Lake Metigoshe	Bottineau	$47,515
ND PARKS AND RECREATION DEPARTMENT	White Pelican Cabin	2100-070 #2 Lake Metigoshe	Bottineau	$47,408
ND PARKS AND RECREATION DEPARTMENT	Restroom	2040-038 4480 Fort Lincoln Rd	Mandan	$47,376
CENTRAL GRASSLANDS RESEARCH CENTER	Equipment Storage Shed A	4824 48th Ave SE	Streeter	$47,300
NDSU AG EXPERIMENT RESEARCH	Three Stall Garage	19th Ave North	Fargo	$57,122

Description	Building Name	Address	City	Insured Amount
DOT MTCE & ENG SERVICES/FARGO	Leonard Storage Building	5365 154th Ave SE	Leonard	$46,800
ND PARKS AND RECREATION DEPARTMENT	1600 Sq Ft Octagon Shelter	2050-007 1403 River Rd	Center	$46,100
ND PARKS AND RECREATION DEPARTMENT	392 Sq Ft Cabin	2080-052 5981 Walt Hjelle Parkway	Fort Ransom	$46,026
ND PARKS AND RECREATION DEPARTMENT	Restroom	2070-002 1252A 41st Ave NW	Garrison	$45,818
NDSU AG EXPERIMENT RESEARCH	Loafing Barn	19th Ave North	Fargo	$45,700
NDSU AG EXPERIMENT RESEARCH	Loafing Barn	19th Ave North	Fargo	$45,700
ND PARKS AND RECREATION DEPARTMENT	Amphitheater	2110-033 781 42 1/2 Ave NW	Pick City	$45,300
ND PARKS AND RECREATION DEPARTMENT	Amphitheater	2070-044 1252A 41st Ave NW	Garrison	$45,517
ND PARKS AND RECREATION DEPARTMENT	Amphitheater	2130-020 4904 119th Rd NW	Epping	$45,300
ND FOREST SERVICE	Storage Building (J)	3 Miles North of City	Towner	$71,000
ND PARKS AND RECREATION DEPARTMENT	Seasonal Housing	2050-181 1403 River Rd	Center	$45,200
ND PARKS AND RECREATION DEPARTMENT	Historic Barn	2080-012 5981 Walt Hjelle Parkway	Fort Ransom	$45,030
ND GAME AND FISH	Pump House	SE4 SE4 Sec 18T153R101	Williston	$146,103
ND PARKS AND RECREATION DEPARTMENT	Shelter/Windbreak	2090-017 13571 Hwy 5	Cavalier	$44,400
ND HISTORICAL SOCIETY	Summer Kitchen	845 88th St SE	Strasburg	$45,457
ND DEPT OF CORRECTIONS & REHABILITATION	Ice House	701 16th Ave SW	Mandan	$44,024
CARRINGTON RESEARCH CENTER	Hay Storage Building	663 Hwy 281 NE	Carrington	$43,800
CENTRAL GRASSLANDS RESEARCH CENTER	Cattle Barn	4824 48th Ave SE	Streeter	$44,540
ADJUTANT GENERAL, CAMP GRAFTON	Air Operations Building	4417 Hwy 20	Devils Lake	$43,700
ADJUTANT GENERAL, CAMP GRAFTON	Air Operations Building	4417 Hwy 20	Devils Lake	$43,700

Description	Building Name	Address	City	Insured Amount
ND HISTORICAL SOCIETY	Whitestone Office Building	7310 86th St SE	Kulm	$43,648
ND PARKS AND RECREATION DEPARTMENT	Storage Building	2050-032 1403 River Rd	Center	$44,120
ND GAME AND FISH	Pavilion & Storage Building	100 N Bismarck Expressway	Bismarck	$46,836
ND STATE HOSPITAL	2206 Double Garage	2206 Cottage Lane	Jamestown	$43,400
ADJUTANT GENERAL, OFFICE OF THE	3-Stall Garage	1400 28th Ave N	Fargo	$43,200
ND STATE HOSPITAL	TL-1 Double Garage	2208 Cottage Lane	Jamestown	$43,200
ND ATMOSPHERIC RESOURCE BOARD	Radar Equipment Building	14011 86th St SW	Bowman	$1,320,236
NORTH DAKOTA STATE UNIVERSITY	Minard Enclosed Bus Stop	1337 Administration Ave	Fargo	$42,800
NORTH DAKOTA STATE UNIVERSITY	ABEN Enclosed Bus Stop	1337 Administration Ave	Fargo	$42,800
NORTH DAKOTA STATE UNIVERSITY	Softball Home Team Dugout	1750 17th Ave N	Fargo	$42,600
ND HISTORICAL SOCIETY	6-Shelters	3448 Chateau Road	Medora	$42,000
ND PARKS AND RECREATION DEPARTMENT	3-Cabins	2070-056-057-058 1252A 41st Ave NW	Garrison	$42,000
ND PARKS AND RECREATION DEPARTMENT	Marina/Residence	2110-002 781 42 1/2 Ave NW	Pick City	$42,232
NDSU AG EXPERIMENT RESEARCH	Loafing Barn	19th Ave North	Fargo	$41,700
NDSU AG EXPERIMENT RESEARCH	Loafing Barn	19th Ave North	Fargo	$41,700
NDSU AG EXPERIMENT RESEARCH	Loafing Barn	19th Ave North	Fargo	$41,700
NDSU AG EXPERIMENT RESEARCH	Loafing Barn	19th Ave North	Fargo	$41,700
ND PARKS AND RECREATION DEPARTMENT	Cold Storage Building	3084 Park Ave	Arvilla	$41,587
ND STATE HOSPITAL	Grounds Department Storage	2532 Circle Dr	Jamestown	$42,147
HETTINGER RESEARCH CENTER	Sheep Shed VII	102 1/2 Hwy 12 W	Hettinger	$41,000
ND HISTORICAL SOCIETY	WPA Center	1150 37th St SW	Center	$40,500
ND PARKS AND RECREATION DEPARTMENT	Residence Garage	2140-006 3084 Park Ave	Arvilla	$40,400
UNIVERSITY OF NORTH DAKOTA	Golf Maintenance Building	706 S 34th St	Grand Forks	$48,100

Description	Building Name	Address	City	Insured Amount
DAKOTA COLLEGE AT BOTTINEAU	Concession/Restroom Facility	105 Simrall Blvd	Bottineau	$49,271
ND GAME AND FISH	Cold Storage for Enforcement Equipment	3001 E Main Ave	Bismarck	$40,000
ND PARKS AND RECREATION DEPARTMENT	Park Shelter	2130-007 4904 119th Rd NW	Epping	$40,000
CARRINGTON RESEARCH CENTER	NW C Livestock Barn	6689 6th St NE	Carrington	$39,900
ND PARKS AND RECREATION DEPARTMENT	Shop/Storage Building	2530-003 14651 36th St	Medora	$42,270
ND VETERANS HOME	3-Stall Garage	1600 Veterans Dr	Lisbon	$49,779
CARRINGTON RESEARCH CENTER	SW A Livestock Barn	6689 6th St NE	Carrington	$38,800
CARRINGTON RESEARCH CENTER	Bull Barn	6689 6th St NE	Carrington	$73,800
CARRINGTON RESEARCH CENTER	SW B Livestock Barn	663 Hwy 281 NE	Carrington	$38,800
CARRINGTON RESEARCH CENTER	NW D Livestock Barn	6689 6th St NE	Carrington	$38,800
ADJUTANT GENERAL, CAMP GRAFTON	Ammunition Issue Building	8870 Hwy 15	McHenry	$38,800
DICKINSON RESEARCH CENTER	Office	11090 15th St SW	Manning	$56,938
NDSU AG EXPERIMENT RESEARCH	Beef Scale Barn	19th Ave North	Fargo	$48,058
NDSU AG EXPERIMENT RESEARCH	Plot Storage Building	15th Ave North	Fargo	$45,354
BISMARCK COMMUNITY BOWL	Pump House & Equipment	1701 Canary Ave	Bismarck	$37,900
ND DEPT OF CORRECTIONS & REHABILITATION	Manager's Storage	1800 48th Ave SW	Bismarck	$44,574
DAKOTA COLLEGE AT BOTTINEAU	Lath House	105 Simrall Blvd	Bottineau	$38,262
ND PARKS AND RECREATION DEPARTMENT	Storage Building	2010-020 3850 70th St SE	Wishek	$40,640
MAYVILLE STATE UNIVERSITY	Press Box	Campus Drive	Mayville	$38,023
ND HISTORICAL SOCIETY	Maintenance Shop	838 28th Ave SW	Washburn	$59,154
ND GAME AND FISH	Storage @ Mallard Island	Hwy 83 N	Coleharbor	$39,271
NDSU AG EXPERIMENT RESEARCH	Lab Building	19th Ave North	Fargo	$46,322
ND PARKS AND RECREATION DEPARTMENT	Dry Storage Building	2510-024 990 Hwy 22 North	Killdeer	$35,900

Description	Building Name	Address	City	Insured Amount
ADJUTANT GENERAL, OFFICE OF THE	2-Stall Garage	330 Fraine Barracks Dr	Bismarck	$34,800
ND PARKS AND RECREATION DEPARTMENT	400 Sq Ft Cabin	2110-009 781 42 1/2 Ave NW	Pick City	$34,573
ND PARKS AND RECREATION DEPARTMENT	Storage Building	2130-037 4904 119th Rd NW	Epping	$38,122
WILLISTON RESEARCH CENTER	Service Station*	14120 Hwy 2	Williston	$35,040
ND PARKS AND RECREATION DEPARTMENT	400 Sq Ft Cabin	2090-053 13571 Hwy 5	Cavalier	$34,295
MINOT STATE UNIVERSITY	Observatory	500 University Ave W	Minot	$41,130
ND PARKS AND RECREATION DEPARTMENT	192 Sq Ft Lewis Cabin/Ramp	2130-182 4904 119th Rd NW	Epping	$33,700
ND PARKS AND RECREATION DEPARTMENT	Double Garage	2150-186 152 S Duncan Rd	Devils Lake	$33,700
ND STATE COLLEGE OF SCIENCE	Storage Building	7th St North	Wahpeton	$33,699
NDSU AG EXPERIMENT RESEARCH	Storage Building	1823 15th Ave North	Fargo	$40,154
BISMARCK STATE COLLEGE	Double Garage	1613 Edwards Ave	Bismarck	$200,594
ND PARKS AND RECREATION DEPARTMENT	192 Sq Ft Clark Cabin	2130-181 4904 119th Rd NW	Epping	$33,400
ND PARKS AND RECREATION DEPARTMENT	Amphitheater Building	4480 Fort Lincoln Rd	Mandan	$33,024
ND GAME AND FISH	Warehouse	7 Miles W/1 Mile N Hwy 43	St John	$82,633
ND DEPT OF CORRECTIONS & REHABILITATION	Garage	701 16th Ave SW	Mandan	$32,400
ND PARKS AND RECREATION DEPARTMENT	2 - 240 Sq Ft Cabins	2090-057-058 13571 Hwy 5	Cavalier	$32,390
ADJUTANT GENERAL, CAMP GRAFTON	Test Lab	4417 Hwy 20	Devils Lake	$31,600
BISMARCK STATE COLLEGE	Swenson Storage/Phone Building	1411 Schafer St	Bismarck	$31,500
ND DEPT OF CORRECTIONS & REHABILITATION	Vehicle Machine Storage	3303 East Main	Bismarck	$31,360
ND PARKS AND RECREATION DEPARTMENT	Ranger's Garage	2040-049 4480 Fort Lincoln Rd	Mandan	$31,300

Description	Building Name	Address	City	Insured Amount
ND STATE HOSPITAL	Smoking Station	2605 Circle Dr	Jamestown	$31,000
ND GAME AND FISH	Storage	4561 103rd Ave SW	Gladstone	$30,745
ND DEPT OF CORRECTIONS & REHABILITATION	Equipment Repair Shop	1800 48th Ave SW	Bismarck	$42,481
LIFE SKILLS & TRANSITION CENTER	Screened Shelter	701 West 6th St	Grafton	$30,240
LIFE SKILLS & TRANSITION CENTER	Screened Shelter	701 West 6th St	Grafton	$30,240
LIFE SKILLS & TRANSITION CENTER	Open Picnic Shelter	701 West 6th St	Grafton	$30,240
ADJUTANT GENERAL, CAMP GRAFTON	2-Metal Buildings	4417 Hwy 20	Devils Lake	$30,051
ND HISTORICAL SOCIETY	Fort Clark Restroom	1150 37th St SW	Center	$30,000
ADJUTANT GENERAL, CAMP GRAFTON	Garage	4417 Hwy 20	Devils Lake	$29,800
LANGDON RESEARCH CENTER	Tractor Storage Building	9280 107th Ave NE	Langdon	$37,638
ND HISTORICAL SOCIETY	Fort Mandan Picnic Shelter #1	838 28th Ave SW	Washburn	$29,600
DOT MTCE & ENG SERVICES/RADIO	480 sq. ft. Arnegard Radio Bldg	3442 134th Ave NW - 200' Tower	Arnegard	$109,987
ND PARKS AND RECREATION DEPARTMENT	Maintenance Shop	2150-003 152 S Duncan Rd	Devils Lake	$29,400
ND PARKS AND RECREATION DEPARTMENT	2-240 Sq Ft Cabins	2040-026-027 4480 Fort Lincoln Rd	Mandan	$29,639
ADJUTANT GENERAL, CAMP GRAFTON	Storage Building	4417 Hwy 20	Devils Lake	$29,200
ND GAME AND FISH	Chemical Storage Building	1851 23rd Ave NE	Harvey	$50,233
DICKINSON RESEARCH CENTER	4320 Sq Ft Hoop Shed	11090 15th St SW	Manning	$37,464
ND GAME AND FISH	Storage Building	403 Dakota Ave	Riverdale	$28,400
ADJUTANT GENERAL, OFFICE OF THE	Storage	260 Fraine Barracks Lane	Bismarck	$28,300
ND PARKS AND RECREATION DEPARTMENT	Storage Building	2140-063 3084 Park Ave	Arvilla	$28,456
DOT MTCE & ENG SERVICES/RADIO	480 sq. ft. Williston Radio Bldg	12737 48th St NW - 300' tower	Williston	$132,110
ND GAME AND FISH	Pump Building	Sec 17-180W-137N	Mandan	$37,716
ND PARKS AND RECREATION DEPARTMENT	Storage Building	2080-037 5981 Walt Hjelle Parkway	Fort Ransom	$43,079
LAKE REGION STATE COLLEGE	Storage Building	1801 College Dr N	Devils Lake	$27,800

Description	Building Name	Address	City	Insured Amount
ND PARKS AND RECREATION DEPARTMENT	Storage Building	2100-060 #2 Lake Metigoshe	Bottineau	$31,554
ND DEPT OF CORRECTIONS & REHABILITATION	Carpenter Shop	1800 48th Ave SW	Bismarck	$28,575
DOT MTCE & ENG SERVICES/RADIO	480 sq. ft. Dickinson Radio Bldg	4720 117 R Ave SW - 300' tower	Dickinson	$131,343
BISMARCK STATE COLLEGE	Single Stall Garage	1613 Edwards Ave	Bismarck	$40,885
ADJUTANT GENERAL, CAMP GRAFTON	Ammunition Building	8870 Hwy 15	McHenry	$27,200
ND HISTORICAL SOCIETY	Fahlgren Park Shelter #1	838 28th Ave SW	Washburn	$27,100
ND HISTORICAL SOCIETY	Fahlgren Park Shelter #2	838 28th Ave SW	Washburn	$27,100
UNIVERSITY OF NORTH DAKOTA	Bus Shelter	East side of REA on Hamline	Grand Forks	$27,100
NORTH CENTRAL RESEARCH CENTER	Garage	5400 Hwy 83 South	Minot	$26,900
ADJUTANT GENERAL, CAMP GRAFTON	Ammunition Issue	8870 Hwy 15	McHenry	$26,400
MAYVILLE STATE UNIVERSITY	Concession Building	Campus Drive	Mayville	$26,940
ND DEPT OF CORRECTIONS & REHABILITATION	Warden's Dwelling Garage	3100 Railroad Ave	Bismarck	$26,000
ND DEPT OF CORRECTIONS & REHABILITATION	Deputy Warden's Dwelling Garage	3100 Railroad Ave	Bismarck	$26,000
ND PARKS AND RECREATION DEPARTMENT	240 Sq Ft Cabin	2010-183 3850 70th St SE	Wishek	$25,900
ND PARKS AND RECREATION DEPARTMENT	240 Sq Ft Cabin	2010-182 3850 70th St SE	Wishek	$25,900
NORTH DAKOTA STATE UNIVERSITY	Landscape Greenhouse	2030 Centennial Blvd N	Fargo	$38,873
ADJUTANT GENERAL, CAMP GRAFTON	Officer's Latrine	4417 Hwy 20	Devils Lake	$25,353
ADJUTANT GENERAL, CAMP GRAFTON	Officer's Latrine	4417 Hwy 20	Devils Lake	$25,353
ADJUTANT GENERAL, CAMP GRAFTON	Officer's Latrine	4417 Hwy 20	Devils Lake	$25,353
ND GAME AND FISH	Storage Building	7928 45th ST NE	Devils Lake	$25,300
ND SCHOOL FOR THE DEAF	6-Stall Garage North	1401 College Dr N	Devils Lake	$26,477
ND PARKS AND RECREATION DEPARTMENT	Vault Toilet 3	4480 Fort Lincoln Rd	Mandan	$25,056

Description	Building Name	Address	City	Insured Amount
ND PARKS AND RECREATION DEPARTMENT	Vault Toilet 4	4480 Fort Lincoln Rd	Mandan	$25,056
ADJUTANT GENERAL, OFFICE OF THE	Storage	240 Fraine Barracks Lane	Bismarck	$25,000
DOT MTCE & ENG SERVICES/RADIO	New Leipzig Building/Tower	7110 76th St SW	Elgin	$104,819
ND PARKS AND RECREATION DEPARTMENT	Garage	2150-036 152 S Duncan Rd	Devils Lake	$24,800
ND HISTORICAL SOCIETY	Storage Building	935 Broadway	Abercrombie	$24,735
NDSU AG EXPERIMENT RESEARCH	Two Stall Garage	19th Ave North	Fargo	$24,600
ND PARKS AND RECREATION DEPARTMENT	240 Sq Ft Cabin	2110-013 781 42 1/2 Ave NW	Pick City	$24,300
HETTINGER RESEARCH CENTER	Vehicle Garage	102 1/2 Hwy 12 W	Hettinger	$26,598
DICKINSON RESEARCH CENTER	Cattle Shelter VII	11090 15th St SW	Manning	$24,019
ND PARKS AND RECREATION DEPARTMENT	Stables	4480 Fort Lincoln Rd	Mandan	$24,000
HETTINGER RESEARCH CENTER	Sheep Shed VI	102 1/2 Hwy 12 W	Hettinger	$23,900
ND PARKS AND RECREATION DEPARTMENT	Vault Toilet - Amphitheater	13571 Highway 5	Cavalier	$23,800
ADJUTANT GENERAL, CAMP GRAFTON	Storage Building	4417 Hwy 20	Devils Lake	$23,600
DOT MTCE & ENG SERVICES/RADIO	480 sq. ft. Grand Forks Radio Bldg	8500 55th St N - 300' tower	Grand Forks	$127,626
ADJUTANT GENERAL, OFFICE OF THE	Storage Building	1501 Hwy 281 N	Jamestown	$23,500
NDSU AG EXPERIMENT RESEARCH	432 Sq Ft Anaerobic Digester Bldg	19th Ave North	Fargo	$23,400
ND PARKS AND RECREATION DEPARTMENT	Storage Building	2150-052 152 S Duncan Rd	Devils Lake	$23,573
DOT MTCE & ENG SERVICES/RADIO	544 sq. ft. Valley City Radio Bldg	3475 122nd Ave SE - 300' tower	Valley City	$127,449
NDSU AG EXPERIMENT RESEARCH	Residential Garage	3152 19th Ave North	Fargo	$24,645
NORTH CENTRAL RESEARCH CENTER	Fuel Storage Building	5400 Hwy 83 South	Minot	$25,537
ADJUTANT GENERAL, CAMP GRAFTON	Storage Building	4417 Hwy 20	Devils Lake	$22,800

Description	Building Name	Address	City	Insured Amount
NDSU AG EXPERIMENT RESEARCH	391 Sq Ft Anaerobic Digester Bldg	19th Ave North	Fargo	$22,600
NDSU AG EXPERIMENT RESEARCH	Two Stall Garage	19th Ave North	Fargo	$22,500
OAKES RESEARCH CENTER	Storage Building	Hwy 1 South	Oakes	$25,911
ND PARKS AND RECREATION DEPARTMENT	Entrance Station	2040-080 4480 Fort Lincoln Rd	Mandan	$23,828
DICKINSON RESEARCH CENTER	Bldg F/Grounds Storage Bldg	1041 State Ave	Dickinson	$25,721
ADJUTANT GENERAL, CAMP GRAFTON	Bridge Storage	4417 Hwy 20	Devils Lake	$22,300
ND PARKS AND RECREATION DEPARTMENT	192 Sq Ft #4 Pike Cabin	2150-181 152 S Duncan Rd	Devils Lake	$21,883
ND PARKS AND RECREATION DEPARTMENT	192 Sq Ft #2 Perch Cabin	2150-182 152 S Duncan Rd	Devils Lake	$21,883
ND PARKS AND RECREATION DEPARTMENT	192 Sq Ft #1 Walleye Cabin	2150-183 152 S Duncan Rd	Devils Lake	$21,883
ND PARKS AND RECREATION DEPARTMENT	192 Sq Ft #2 Pike Cabin	2150-184 152 S Duncan Rd	Devils Lake	$21,883
DAKOTA COLLEGE AT BOTTINEAU	Storage Building	105 Simrall Blvd	Bottineau	$21,777
VALLEY CITY STATE UNIVERSITY	Storage Building	101 SW College St	Valley City	$21,622
ND PARKS AND RECREATION DEPARTMENT	Historic Visitor Center	2080-002 5981 Walt Hjelle Parkway	Fort Ransom	$27,588
ND PARKS AND RECREATION DEPARTMENT	Rental Cabin/Deck/Ramp	2010-043 3850 70th St SE	Wishek	$22,429
DOT MTCE & ENG SERVICES/RADIO	352 sq. ft. Tioga Radio Bldg	6143 103rd Ave NW - 300' tower	Tioga	$125,443
NDSU AG EXPERIMENT RESEARCH	2-Stall Garage	19th Ave North	Fargo	$23,329
NDSU AG EXPERIMENT RESEARCH	2-Stall Garage	19th Ave North	Fargo	$21,300
NDSU AG EXPERIMENT RESEARCH	2-Stall Garage	19th Ave North	Fargo	$21,300
ADJUTANT GENERAL, CAMP GRAFTON	Bridge Storage	4417 Hwy 20	Devils Lake	$21,300
ND PARKS AND RECREATION DEPARTMENT	Trailhead House	2100-046 #2 Lake Metigoshe	Bottineau	$21,280

Description	Building Name	Address	City	Insured Amount
ADJUTANT GENERAL, CAMP GRAFTON	Tower Building	4417 Hwy 20	Devils Lake	$373,658
DOT MTCE & ENG SERVICES/RADIO	480 sq. ft. Devils Lake Radio Bldg	7747 Ephraim Hill Road W - 300' tower	Devils Lake	$125,030
ADJUTANT GENERAL, CAMP GRAFTON	Soldier Weather Protection	4417 Hwy 20	Devils Lake	$20,900
ADJUTANT GENERAL, CAMP GRAFTON	Storage Building	4417 Hwy 20	Devils Lake	$20,700
ADJUTANT GENERAL, CAMP GRAFTON	Storage Building	4417 Hwy 20	Devils Lake	$22,200
ND PARKS AND RECREATION DEPARTMENT	Vault Toilet 1	4480 Fort Lincoln Rd	Mandan	$20,448
DICKINSON RESEARCH CENTER	Small Storage Shed I	1041 State Ave	Dickinson	$24,451
ND PARKS AND RECREATION DEPARTMENT	Storage Building	2510-022 990 Hwy 22 North	Killdeer	$21,928
ND HOUSING FINANCE AGENCY	Single Family w/Detached Garage	100 4th St SW	Parshall	$20,396
ND DEPT OF CORRECTIONS & REHABILITATION	Sunny Farm Equipment Storage	4095 Sunny Dr South	Mandan	$20,304
CARRINGTON RESEARCH CENTER	Pole Barn III	6689 6th St NE	Carrington	$20,300
ADJUTANT GENERAL, CAMP GRAFTON	Storage Building	4417 Hwy 20	Devils Lake	$20,300
ND PARKS AND RECREATION DEPARTMENT	Vault Toilet -Primitive	13571 Highway 5	Cavalier	$20,300
ND RAILROAD MUSEUM	Maintenance Building	3102 37th St NW	Mandan	$20,000
UNIVERSITY OF NORTH DAKOTA	Englestad Steam House	2459 2nd Ave N	Grand Forks	$89,668
ND HISTORICAL SOCIETY	Granary/Garage	845 88th St SE	Strasburg	$19,600
ND PARKS AND RECREATION DEPARTMENT	600 Sq Ft Rectangular Shelter	2050-008 1403 River Rd	Center	$19,600
HETTINGER RESEARCH CENTER	Well House/Equipment	102 1/2 Hwy 12 W	Hettinger	$19,400
ADJUTANT GENERAL, CAMP GRAFTON	Storage Building	4417 Hwy 20	Devils Lake	$19,300
ADJUTANT GENERAL, CAMP GRAFTON	Storage Building	4417 Hwy 20	Devils Lake	$19,300
CARRINGTON RESEARCH CENTER	Corn Crib	663 Hwy 281 NE	Carrington	$19,200
ND HISTORICAL SOCIETY	Fahlgren Park Vault Restroom	838 28th Ave SW	Washburn	$19,200
ADJUTANT GENERAL, CAMP GRAFTON	Range Operation Building	4417 Hwy 20	Devils Lake	$19,000

Description	Building Name	Address	City	Insured Amount
ADJUTANT GENERAL, CAMP GRAFTON	Range Operation Building	4417 Hwy 20	Devils Lake	$19,000
ND GAME AND FISH	Hunter Ed Bldg/Shelter	2005 Burdick Expy E	Minot	$18,900
DICKINSON RESEARCH CENTER	2880 Sq Ft Hoop Shed	11090 15th St SW	Manning	$26,042
DICKINSON RESEARCH CENTER	2880 Sq Ft Hoop Shed	11090 15th St SW	Manning	$26,042
DICKINSON RESEARCH CENTER	2880 Sq Ft Hoop Shed	11090 15th St SW	Manning	$26,042
ND SCHOOL FOR THE DEAF	5-Stall Garage West	1401 College Dr N	Devils Lake	$20,235
ADJUTANT GENERAL, CAMP GRAFTON	Demolition Range Building	8870 Hwy 15	McHenry	$18,700
ND PARKS AND RECREATION DEPARTMENT	S. T. Storage Building	2150-185 152 S Duncan Rd	Devils Lake	$18,807
ND HISTORICAL SOCIETY	Garage/Storage	3448 Chateau Road	Medora	$18,500
CARRINGTON RESEARCH CENTER	Pesticide Storage	663 Hwy 281 NE	Carrington	$18,820
ADJUTANT GENERAL, CAMP GRAFTON	Range Operation Building	4417 Hwy 20	Devils Lake	$18,300
UNIVERSITY OF NORTH DAKOTA	Internet Observatory #1 Building	1652 23rd St NE	Emerado	$97,743
NORTH DAKOTA STATE UNIVERSITY	RSO/Chemical Storage	1336 19th St N	Fargo	$17,992
ND HISTORICAL SOCIETY	Vault Restroom	7310 86th St SE	Kulm	$17,800
ND HISTORICAL SOCIETY	Vault Restroom	7310 86th St SE	Kulm	$17,800
NDSU AG EXPERIMENT RESEARCH	120 Sq Ft Anaerobic Digester Bldg	19th Ave North	Fargo	$17,800
CARRINGTON RESEARCH CENTER	Service Station	663 Hwy 281 NE	Carrington	$18,340
ND HISTORICAL SOCIETY	Picnic Shelter	7310 86th St SE	Kulm	$17,400
ND PARKS AND RECREATION DEPARTMENT	Restroom	13571 Highway 5	Cavalier	$17,340
ND PARKS AND RECREATION DEPARTMENT	Pine Cabin	13571 Highway 5	Cavalier	$17,052
VALLEY CITY STATE UNIVERSITY	North Pumphouse	101 SW College St	Valley City	$23,339
UNIVERSITY OF NORTH DAKOTA	Bus Shelter with Solar Panels	3450 University Ave	Grand Forks	$16,800
DOT MTCE & ENG SERVICES/RADIO	352 sq. ft. Denhoff Radio Bldg	1381 Hwy 14 NE - 200' tower	Denhoff	$97,243
DOT MTCE & ENG SERVICES/RADIO	352 sq. ft. Milton Radio Bldg	12322 Hwy 66 - 300' tower	Milton	$120,841

Description	Building Name	Address	City	Insured Amount
BISMARCK STATE COLLEGE	Annex Storage	1309 Schafer St	Bismarck	$16,700
ND HISTORICAL SOCIETY	Interpretive Shelter #1	Hwy 83 N	Washburn	$16,700
ND HISTORICAL SOCIETY	Interpretive Shelter #2	Hwy 83 N	Washburn	$16,700
NDSU AG EXPERIMENT RESEARCH	Weather Station	15th Ave North	Fargo	$72,759
ND STATE COLLEGE OF SCIENCE	2-Softball Dugouts	14th Ave N	Wahpeton	$16,400
UNIVERSITY OF NORTH DAKOTA	2-Bus Shelters	6th Ave N & N 40th St	Grand Forks	$16,400
ND PARKS AND RECREATION DEPARTMENT	Vault Toilet -Beach	13571 Highway 5	Cavalier	$16,000
ADJUTANT GENERAL, CAMP GRAFTON	Well House	4417 Hwy 20	Devils Lake	$15,800
ND PARKS AND RECREATION DEPARTMENT	Entrance Station	2070-011 1252A 41st Ave NW	Garrison	$16,152
ND PARKS AND RECREATION DEPARTMENT	192 Sq Ft Log Cabin	2090-054 13571 Hwy 5	Cavalier	$15,500
UNIVERSITY OF NORTH DAKOTA	Soccer Storage Building	6th Ave N & Columbia Rd	Grand Forks	$24,607
ND DEPT OF CORRECTIONS & REHABILITATION	Manager's Garage	1800 48th Ave SW	Bismarck	$15,922
HETTINGER RESEARCH CENTER	Sheep Shed IV	102 1/2 Hwy 12 W	Hettinger	$15,300
HETTINGER RESEARCH CENTER	Sheep Shed V	102 1/2 Hwy 12 W	Hettinger	$15,300
NDSU AG EXPERIMENT RESEARCH	One Stall Garage	19th Ave North	Fargo	$15,300
ND DEPT OF FACILITY MANAGEMENT	Storage Building	1131 4th St	Bismarck	$19,468
VALLEY CITY STATE UNIVERSITY	Pumphouse A	101 SW College St	Valley City	$21,439
ND STATE HOSPITAL	Garage	2326 Circle Dr	Jamestown	$15,100
ND PARKS AND RECREATION DEPARTMENT	Park Shelter 1	4480 Fort Lincoln Rd	Mandan	$15,040
UNIVERSITY OF NORTH DAKOTA	EERC Utility Storage Building	15 N 23rd St	Grand Forks	$15,000
ND GAME AND FISH	Video Pavilion	2005 Burdick Expy E	Minot	$14,751
ND GAME AND FISH	Fishing Bldg/Shelter	2005 Burdick Expy E	Minot	$15,329
CASSELTON RESEARCH CENTER	Scale House	15449 37th Street SE	Casselton	$137,404

Description	Building Name	Address	City	Insured Amount
ND PARKS AND RECREATION DEPARTMENT	Storage Building	2040-047 4480 Fort Lincoln Rd	Mandan	$14,400
ND STATE FAIR	2-Tool Sheds*	2005 Burdick Expressway E	Minot	$18,809
ND GAME AND FISH	Information Building	2005 Burdick Expy E	Minot	$14,670
ND PARKS AND RECREATION DEPARTMENT	Amphitheatre	2050-005 1403 River Rd	Center	$15,049
ND PARKS AND RECREATION DEPARTMENT	400 Sq Ft Octagon Shelter	2050-019 1403 River Rd	Center	$14,100
UNIVERSITY OF NORTH DAKOTA	EERC HPT Gas Storage	15 N 23rd St	Grand Forks	$174,067
UNIVERSITY OF NORTH DAKOTA	Picnic Shelter	Between State St & Stanford Rd	Grand Forks	$13,900
UNIVERSITY OF NORTH DAKOTA	Picnic Shelter	110 State St	Grand Forks	$13,900
ND GAME AND FISH	Storage	4561 103rd Ave SW	Gladstone	$13,871
ND FOREST SERVICE	Lake Metigoshe Storage Building	14 Miles NE Hwy 14 & 43	Lake Metigoshe	$15,565
ND HISTORICAL SOCIETY	Comfort Station	7310 86th St SE	Kulm	$13,300
UNIVERSITY OF NORTH DAKOTA	Police Storage Garage	3875 Campus Road	Grand Forks	$13,040
ND FOREST SERVICE	Twisted Oaks Vault Restroom	1.56 Miles E Hwy 14 & 43	Bottineau	$12,905
BISMARCK STATE COLLEGE	Mandan Lineworker Storage	3201 Nygren Dr	Mandan	$19,443
ND FOREST SERVICE	Vault Restroom @ Long Lake	18-1/2 Miles Northeast	Bottineau	$12,530
ND FOREST SERVICE	Vault Restroom @ Mystical Horizons	12 Miles Northwest on Hwy 43	Bottineau	$12,530
ND PARKS AND RECREATION DEPARTMENT	Vault Toilet 2	4480 Fort Lincoln Rd	Mandan	$12,528
MINOT STATE UNIVERSITY	Practice Field Storage	500 University Ave W	Minot	$17,786
ND PARKS AND RECREATION DEPARTMENT	Firewood Shed	13571 Hwy 5	Cavalier	$12,468
HETTINGER RESEARCH CENTER	Sheep Shed III	102 1/2 Hwy 12 W	Hettinger	$12,400
DOT MTCE & ENG SERVICES/RADIO	200 sq. ft. Linton Radio Bldg	7515 Hwy 83 - 185' tower	Linton	$151,385
CARRINGTON RESEARCH CENTER	Dryer Building	663 Hwy 281 NE	Carrington	$12,300
ND HISTORICAL SOCIETY	Magazine	Cavalry Square	Ft. Totten	$12,000

Description	Building Name	Address	City	Insured Amount
NDSU AG EXPERIMENT RESEARCH	Feed Storage Bunker	3136 19th Ave North	Fargo	$12,000
DICKINSON RESEARCH CENTER	Pump House & Interior Equipment	1041 State Ave	Dickinson	$11,900
NDSU AG EXPERIMENT RESEARCH	80 Sq Ft Anaerobic Digester Bldg	19th Ave North	Fargo	$11,799
CARRINGTON RESEARCH CENTER	Single Car Garage	663 Hwy 281 NE	Carrington	$12,132
ND FOREST SERVICE	Hahns Bay Vault Toilet	103 6th St East	Bottineau	$11,613
ND FOREST SERVICE	Strawberry Lake Vault Toilet	7 Miles NE Hwy 5 & 14	Bottineau	$11,613
UNIVERSITY OF NORTH DAKOTA	Storage Building	525 Stanford Road	Grand Forks	$11,600
ND PARKS AND RECREATION DEPARTMENT	Firewood Shed	1403 River Road	Center	$11,550
ADJUTANT GENERAL, CAMP GRAFTON	Storage Building	4417 Hwy 20	Devils Lake	$11,000
ND PARKS AND RECREATION DEPARTMENT	192 Sq Ft Cabin	2110-014 781 42 1/2 Ave NW	Pick City	$10,857
ND FOREST SERVICE	Hahn's Bay Vault Restroom	103 6th St E	Bottineau	$10,640
ND PARKS AND RECREATION DEPARTMENT	Storage Building	2070-015 1252A 41st Ave NW	Garrison	$10,385
ND PARKS AND RECREATION DEPARTMENT	Park Shelter 4	4480 Fort Lincoln Rd	Mandan	$10,368
ND STATE COLLEGE OF SCIENCE	Ticket Booth	14 Ave N	Wahpeton	$10,000
ND SCHOOL FOR THE DEAF	Poultry House	1401 College Dr N	Devils Lake	$9,600
BISMARCK COMMUNITY BOWL	NE Ticket Booth	1701 Canary Ave	Bismarck	$9,500
ND PARKS AND RECREATION DEPARTMENT	Entrance Station	2110-029 781 42 1/2 Ave NW	Pick City	$9,605
MAYVILLE STATE UNIVERSITY	Ticket Building	Stan Dakken Dr	Mayville	$9,453
BISMARCK COMMUNITY BOWL	Upper SW Ticket Booth	1701 Canary Ave	Bismarck	$9,400
BISMARCK COMMUNITY BOWL	Lower SW Ticket Booth	1701 Canary Ave	Bismarck	$9,400
CENTRAL GRASSLANDS RESEARCH CENTER	East Granary @ Iszler Farm	4647 47th Ave SE	Streeter	$9,374
CENTRAL GRASSLANDS RESEARCH CENTER	Garage @ Iszler Farm	4647 47th Ave SE	Streeter	$9,275
ND SCHOOL FOR THE DEAF	Log Cabin Storage	1401 College Dr N	Devils Lake	$9,091

Description	Building Name	Address	City	Insured Amount
ND FOREST SERVICE	Hahns Bay Vault Toilet	103 6th St East	Bottineau	$8,927
ND FOREST SERVICE	Strawberry Lake Vault Toilet	7 Miles NE Hwy 5 & 14	Bottineau	$8,927
DAKOTA COLLEGE AT BOTTINEAU	Greenhouse Equipment Storage	105 Simrall Blvd	Bottineau	$8,554
ND DEPT OF CORRECTIONS & REHABILITATION	Carpenter Shop Storage Building	701 16th Ave SW	Mandan	$9,129
ND PARKS AND RECREATION DEPARTMENT	Vault Toilet- North	13571 Highway 5	Cavalier	$8,400
ND SCHOOL FOR THE DEAF	Tool House Storage	1401 College Dr N	Devils Lake	$9,214
DICKINSON RESEARCH CENTER	Fuel Shed	1041 State Ave	Dickinson	$8,673
ND PARKS AND RECREATION DEPARTMENT	Amphitheater	2140-051 3084 Park Ave	Arvilla	$8,000
ND DEPT OF CORRECTIONS & REHABILITATION	Ball Park Storage Building	701 16th Ave SW	Mandan	$8,463
WILLISTON RESEARCH CENTER	Scale House	14120 Hwy 2	Williston	$98,532
ND GAME AND FISH	Fish Cabin	2005 Burdick Expy E	Minot	$7,575
ND GAME AND FISH	Trapping Building	2005 Burdick Expy E	Minot	$7,575
ND FOREST SERVICE	Tool Building (C)	1037 Forestry Dr	Bottineau	$16,976
ADJUTANT GENERAL, CAMP GRAFTON	Bathhouse	4417 Hwy 20	Devils Lake	$7,450
BISMARCK COMMUNITY BOWL	SE Ticket Booth	1701 Canary Ave	Bismarck	$7,400
ND FOREST SERVICE	Twisted Oaks Vault Toilet	1.56 Miles E Hwy 14 & 43	Bottineau	$7,304
ND FOREST SERVICE	Sandy Lake Vault Toilet	15 3/4 Miles NE Hwy 14 & 43	Bottineau	$7,304
ND FOREST SERVICE	Pelican Lake Vault Toilet	15 3/4 Miles NE Hwy 14 & 43	Bottineau	$7,304
OAKES RESEARCH CENTER	Chemical Storage Building	Hwy 1 South	Oakes	$7,300
ND PARKS AND RECREATION DEPARTMENT	Vault Toilet- South	13571 Highway 5	Cavalier	$6,900
ND PARKS AND RECREATION DEPARTMENT	Vault Toilet- West	1357 Highway 5	Cavalier	$6,900
DAKOTA COLLEGE AT BOTTINEAU	Material Storage	105 Simrall Blvd	Bottineau	$7,263
DICKINSON RESEARCH CENTER	Small Storage Shed II	1041 State Ave	Dickinson	$6,800

Description	Building Name	Address	City	Insured Amount
ND PARKS AND RECREATION DEPARTMENT	Guard Shack	13571 Highway 5	Cavalier	$6,700
ND PARKS AND RECREATION DEPARTMENT	Firewood Storage Building	13571 Highway 5	Cavalier	$6,656
MAYVILLE STATE UNIVERSITY	Fuel Fill Station	Third St NE	Mayville	$6,600
ND DEPT OF CORRECTIONS & REHABILITATION	Hickory Garden Shed	701 16th Ave SW	Mandan	$6,555
DICKINSON RESEARCH CENTER	Cattle Shelter I	11090 15th St SW	Manning	$6,480
DICKINSON RESEARCH CENTER	Cattle Shelter II	11090 15th St SW	Manning	$6,480
DICKINSON RESEARCH CENTER	Cattle Shelter III	11090 15th St SW	Manning	$6,480
NORTH DAKOTA STATE UNIVERSITY	Hammer Throw Storage Bldg	18th St N & 17th Ave N	Fargo	$11,126
ND PARKS AND RECREATION DEPARTMENT	Vault Toilet 5	4480 Fort Lincoln Rd	Mandan	$6,390
ND PARKS AND RECREATION DEPARTMENT	Park Shelter 2	4480 Fort Lincoln Rd	Mandan	$6,336
DICKINSON RESEARCH CENTER	Fuel Shed	11090 15th St SW	Manning	$7,185
ND PARKS AND RECREATION DEPARTMENT	Firewood Storage Bldg	2140-091 3084 Park Ave	Arvilla	$6,300
ND RAILROAD MUSEUM	Bunkhouse	3102 37th St NW	Mandan	$5,985
ND GAME AND FISH	Trapping Shelter	2005 Burdick Expy E	Minot	$5,874
ND GAME AND FISH	Display Building	2005 Burdick Expy E	Minot	$5,642
ND DEPT OF CORRECTIONS & REHABILITATION	Welding Equip Storage	1800 48th Ave SW	Bismarck	$6,457
ND HIGHWAY PATROL	Storage Shed @ Beach	I-94 West Mile Marker 1	Beach	$5,400
ND HIGHWAY PATROL	Storage Shed @ Bowman	Highway 85 and Highway 12	Bowman	$5,400
ND HIGHWAY PATROL	Storage Shed @ Joliette	Junction I-29 and Highway 5	Joliette	$5,400
ND HIGHWAY PATROL	Storage Shed @ Mooreton	I-29 Mile Marker 9	Mooreton	$5,400
ND HIGHWAY PATROL	Storage Shed @ Alexander	4391 Highway 85 North	Alexander	$5,400
ND HIGHWAY PATROL	Storage Shed @ West Fargo	I-94 Mile Marker	West Fargo	$5,400
ND PARKS AND RECREATION DEPARTMENT	Shed 1 at Ranger's House	4480 Fort Lincoln Rd	Mandan	$5,280

Description	Building Name	Address	City	Insured Amount
NORTH DAKOTA STATE UNIVERSITY	Softball Storage Building	1650 17th Ave N	Fargo	$38,233
ND GAME AND FISH	Display Booth	2005 Burdick Expy E	Minot	$4,539
ND PARKS AND RECREATION DEPARTMENT	Storage Shed	4480 Fort Lincoln Rd	Mandan	$4,400
ND PARKS AND RECREATION DEPARTMENT	Park Shelter 3	4480 Fort Lincoln Rd	Mandan	$4,320
ND PARKS AND RECREATION DEPARTMENT	Picnic Shelter @ Vault Toilet	13571 Highway 5	Cavalier	$4,200
ND DEPT OF CORRECTIONS & REHABILITATION	Pheasant Coop	1800 48th Ave SW	Bismarck	$4,212
ND PARKS AND RECREATION DEPARTMENT	Fuel Shed	13571 Highway 5	Cavalier	$3,664
ND PARKS AND RECREATION DEPARTMENT	Shed 2 at Ranger's House	4480 Fort Lincoln Rd	Mandan	$3,520
ND RAILROAD MUSEUM	Shelter	3102 37th St NW	Mandan	$3,000
ND PARKS AND RECREATION DEPARTMENT	Fuel Shed	4480 Fort Lincoln Rd	Mandan	$2,560
ND RAILROAD MUSEUM	East Speed Shack	3102 37th St NW	Mandan	$2,000
ND RAILROAD MUSEUM	West Speed Shack	3102 37th St NW	Mandan	$2,000
ND RAILROAD MUSEUM	10'x12' Shed	3102 37th St NW	Mandan	$2,000
ND APPROVING AGENCY	Office Property	4201 38th St SW, Suite 206	Fargo	$37,959
ND RETIREMENT & INVESTMENT OFFICE	Office Contents	1600 E Century Ave Ste 3	Bismarck	$611,342
ND BOARD OF NURSING	Contents @ Bismarck	919 S 7th St., Suite 504	Bismarck	$148,468
ND PUBLIC FINANCE AUTHORITY	Office Contents	1200 Memorial Hwy	Bismarck	$77,813
ND STATE ELECTRICAL BOARD	Office Property	1929 N Washington St, Suite A-1	Bismarck	$224,931
ND DEPT OF AGRICULTURE	Department of Agriculture	6th & 14th Floor/State Capitol	Bismarck	$748,586
ND HUMAN RESOURCE MGMT SERVICES	Office Contents	14th Floor/State Capitol	Bismarck	$206,464
ADMINISTRATIVE HEARINGS, OFFICE OF	Office Property	2911 N 14th St - Suite 303	Bismarck	$234,076
ND OFFICE OF THE GOVERNOR	Contents of the Governor's Office	1st Floor/State Capitol	Bismarck	$424,622

Description	Building Name	Address	City	Insured Amount
ND BOARD OF COSMETOLOGY	Office Contents @ Bismarck	4719 Shelburne St, Ste 1	Bismarck	$48,677
ND STATE PLUMBING BOARD	Office Furniture & Equipment	1110 College Dr Suite 210	Bismarck	$34,327
ND SOYBEAN COUNCIL	Office Contents	1555 43rd St S, Suite 103	Fargo	$208,908
ND EDUCATION STANDARDS-PRACTICES BOARD	Office Furniture & Equipment	2718 Gateway Ave Suite 204	Bismarck	$34,050
ND BARLEY COUNCIL	Office Property	1002 Main Ave West #2	West Fargo	$585,185
ND DEPT OF COMMERCE	Community Services Office	1600 East Century Ave Ste 6	Bismarck	$339,701
ND STATE RISK MANAGEMENT DIVISION	Office of Risk Management	1600 East Century Ave Suite 4	Bismarck	$458,509
ND OFFICE OF STATE TAX COMMISSIONER	Office Property	4342 15th Ave S Ste 205	Fargo	$59,070
INDIAN AFFAIRS COMMISSION	Office Contents	Judicial Wing/State Capitol	Bismarck	$25,748
RACING COMMISSION, ND	Office Property	4501 Coleman Street, Suite 100	Bismarck	$51,626
LEGAL COUNSEL FOR INDIGENTS	Office Property	2517 West Main	Valley City	$49,084
NDSU EXTENSION - WEST DISTRICT OFFICE	Bismarck District Office	2718 Gateway Ave #301 & #304	Bismarck	$120,202
ND DEPT OF LABOR & HUMAN RIGHTS	Office Contents	1st Floor/State Capitol	Bismarck	$133,423
ND CORN COUNCIL	Office Property	4852 Rocking Horse Circle S	FARGO	$145,568
ND PUBLIC SERVICE COMMISSION	Contents @ Capitol	Vault, 12th & 13th Floors	Bismarck	$1,471,410
ND WHEAT COMMISSION	Office Equipment/Furniture	2401 46th Ave SE Suite 104	Mandan	$400,876
ND LEGISLATIVE COUNCIL	Legislative Council	600 E Blvd Ave - 2nd Floor	Bismarck	$460,677
ND SECRETARY OF STATE	Office Furniture & Equipment	1st Floor/State Capitol	Bismarck	$814,632
ND VETERANS' AFFAIRS	Office Property	4201 38th St SW, Suite 104	Fargo	$150,888
ND SECURITIES DEPARTMENT	Office Contents	5th Floor/State Capitol	Bismarck	$152,148
ND CENTRAL SERVICES DIVISION	Central Duplicating*	600 E Blvd Ave	Bismarck	$1,928,534
ND OFFICE OF THE STATE TREASURER	Office Contents	3rd Floor/State Capitol	Bismarck	$140,445
ND STATE MANAGEMENT AND BUDGET	Office Contents	4th Floor/State Capitol	Bismarck	$385,146

Description	Building Name	Address	City	Insured Amount
CAREER & TECHNICAL EDUCATION	Office Contents	15th Floor	Bismarck	$543,913
AUDITOR, OFFICE OF THE STATE	Office Contents	3rd Floor/State Capitol	Bismarck	$160,711
ND DEPT OF PUBLIC INSTRUCTION	Office Property	600 E Blvd Ave	Bismarck	$3,752,346
ND COUNCIL ON THE ARTS	Bismarck Office Location	1600 East Century Ave Ste 6	Bismarck	$103,292
ND STATE BEEF COMMISSION	Office Contents	4023 N State St	Bismarck	$111,465
ND DEPT OF EMERGENCY SERVICES	Homeland Security and Administration	035 Fraine Barracks Lane	Bismarck	$831,764
ND PUBLIC EMPLOYEES' RETIREMENT	Business Personal Property	1600 East Century Ave Suite 2	Bismarck	$535,704
ND STATE OILSEED COUNCIL	Office Contents	2401 46 Ave SE Ste 206	Mandan	$7,283
ND MILK MARKETING BOARD	Contents @ Bismarck	400 E Broadway Suite 26	Bismarck	$74,309
ND STATE LIBRARY	Library Contents	604 E Blvd Ave	Bismarck	$10,839,453
MINERAL RESOURCES (O & G), DEPT OF	Office @ Williston	11 1/2 E Broadway	Williston	$44,192
ND ENVIRONMENTAL QUALITY DEPARTMENT	Bismarck Office	918 East Divide Ave	Bismarck	$1,891,645
ND AERONAUTICS COMMISSION	Office Property	2301 Univ Dr/Bldg 1652-22	Bismarck	$158,430
MINERAL RESOURCES (G. S.), DEPT OF	Office Contents	81 Cornell St	Grand Forks	$11,005
ND SUPREME COURT	JCCDB Office Property	125 Slate Dr #2	Bismarck	$28,420
ND DEPT OF FINANCIAL INSTITUTIONS	Office Property	1200 Memorial Hwy	Bismarck	$100,000
ATTORNEY GENERAL, OFFICE OF THE	Attorney General's Office	600 E Blvd Ave	Bismarck	$642,800
ND INSURANCE DEPARTMENT	Insurance Department	5th Floor & Vault of State Capitol	Bismarck	$261,554
ND UNIVERSITY SYSTEM	NDUS Office Property	10th Floor/State Capitol	Bismarck	$64,939
ND HOUSING FINANCE AGENCY	Office Furniture & Equipment	2624 Vermont Ave	Bismarck	$934,057
ND DEPT OF AGRICULTURE	Board of Animal Health Storage	1930 Hancock Dr #113	Bismarck	$73,601
ND PROTECTION AND ADVOCACY PROJECT	Office Property	309 Washington Ave # 403	Williston	$10,000
ND OFFICE OF THE GOVERNOR	Contents of the Lt Governor's Office	1st Floor/State Capitol	Bismarck	$42,461
ND DEPT OF COMMERCE	Dept of Tourism Office	1600 East Century Ave	Bismarck	$212,313
ND OFFICE OF STATE TAX COMMISSIONER	Office Property	135 Sims	Dickinson	$16,325

Description	Building Name	Address	City	Insured Amount
LEGAL COUNSEL FOR INDIGENTS	Office Property	135 Sims Suite 221	Dickinson	$36,853
ND PUBLIC SERVICE COMMISSION	Contents @ T & S Shop	Capitol Grounds	Bismarck	$375,984
ND LEGISLATIVE COUNCIL	Legislative Assembly	600 E Blvd Ave - 2nd Floor	Bismarck	$784,590
ND VETERANS' AFFAIRS	Office Property	4201 38th St SW, Suite 206	Fargo	$37,722
ND SECURITIES DEPARTMENT	Office Contents	701 W 6th Street Suite 312	Grafton	$15,000
ND COUNCIL ON THE ARTS	Fargo Office Location	1342 N Broadway Apt 216	Fargo	$3,443
ND DEPT OF HUMAN SERVICES	NWHSC @ Williston	316 2nd Ave West	Williston	$560,067
ND ENVIRONMENTAL QUALITY DEPARTMENT	Monitor Site	47:15:32 N 101:46:57 W	Beulah	$1,361
ND SUPREME COURT	Supreme Court Property	1st Floor/State Capitol	Bismarck	$404,965
ND DEPT OF FINANCIAL INSTITUTIONS	Office Property	1655 43rd St S Ste 207	Fargo	$110,000
ND WORKFORCE SAFETY & INSURANCE	WSI Office	4165 30th Ave South	Fargo	$136,244
ND UNIVERSITY SYSTEM	NDUS Office Property	1st Floor/J Wing	Bismarck	$83,444
ND SCHOOL FOR THE DEAF	Playground Unit	1401 College Dr N	Devils Lake	$23,915
ND DEPT OF FACILITY MANAGEMENT	Facility Management Office	4th Floor/600 E Blvd Ave	Bismarck	$109,919
ND DEPT OF AGRICULTURE	Division of Noxious Weed Storage	1930 Hancock Dr #111	Bismarck	$18,789
ND PROTECTION AND ADVOCACY PROJECT	Office Property	1408 20th Ave SW #8	Minot	$10,000
ND STATE RADIO COMMUNICATIONS	State Radio Equipment	035 Fraine Barracks Lane	Bismarck	$4,410,403
ND DEPT OF COMMERCE	ED & F Office	1600 East Century Ave	Bismarck	$971,476
ND OFFICE OF STATE TAX COMMISSIONER	Office Property	1600 2nd Ave SW	Minot	$38,662
LEGAL COUNSEL FOR INDIGENTS	Office Property	18 2nd St NE STE 1	Minot	$48,872
ND DEPT OF TRUST LANDS	6-Decorative Light Poles/Fixtures	1707 North 9th St	Bismarck	$11,233
ND LEGISLATIVE COUNCIL	Legislative Computers*	600 E Blvd Ave - 2nd Floor	Bismarck	$312,291
ND VETERANS' AFFAIRS	Office Property	2101 N Elm	Fargo	$18,113
ND SECURITIES DEPARTMENT	NDSU Research & Technology Park	1954 NDSU Research Circle N	Fargo	$3,000
ND CENTRAL SERVICES DIVISION	Central Supply*	600 E Blvd Ave	Bismarck	$172,270

Description	Building Name	Address	City	Insured Amount
CENTER FOR DISTANCE EDUCATION	Rented Office Location	4776 28th Ave S Ste 301	Fargo	$431,796
ND DEPT OF HUMAN SERVICES	NCHSC @ Minot	1015 S Broadway Suite 18 & 21	Minot	$1,491,723
MINERAL RESOURCES (O & G), DEPT OF	Office @ Dickinson	314 3rd Ave West	Dickinson	$75,708
ND ENVIRONMENTAL QUALITY DEPARTMENT	Monitor Site	101st Ave SW	Dunn Center	$143,888
ND SUPREME COURT	Supreme Court Property	2nd Floor/State Capitol	Bismarck	$195,395
ND DEPT OF FINANCIAL INSTITUTIONS	Office Property	2534 17th Ave S STE 1D	Grand Forks	$25,000
ND WORKFORCE SAFETY & INSURANCE	WSI Office	311 South 4th Street Suite 1	Grand Forks	$42,828
ND PROTECTION AND ADVOCACY PROJECT	Office Property	1401 College Dr N	Devils Lake	$10,000
ND STATE RADIO COMMUNICATIONS	Spare Radio Equip @ DOT	218 Airport Road	Bismarck	$150,888
BISMARCK COMMUNITY BOWL	N Grandstand & Additional Bleachers	1701 Canary Ave	Bismarck	$964,084
ND OFFICE OF STATE TAX COMMISSIONER	Office Property	600 E Blvd Ave	Bismarck	$1,326,516
LEGAL COUNSEL FOR INDIGENTS	Office Property	3 4th ST E STE 201	Williston	$42,427
ND DEPT OF TRUST LANDS	1-Parking Lot Light	1707 North 9th St	Bismarck	$4,675
ND CENTRAL SERVICES DIVISION	Surplus Property	1278 Hemlock St Igoe Bldg #12	Bismarck	$157,497
AUDITOR, OFFICE OF THE STATE	Office Contents	2000 Schafer Street Suite 202	Bismarck	$42,856
DOT HIGHWAY DEPARTMENT	Kiosk @ DOT Central Office	608 E Boulevard Ave	Bismarck	$132,000
ND SUPREME COURT	Cass Co Office Property	211 9th St S	Fargo	$899,067
ND WORKFORCE SAFETY & INSURANCE	WSI Office	1600 2nd Ave SW Suite #29	Minot	$48,590
ND WATER COMMISSION	Bismarck Office Building	900 E Blvd Ave	Bismarck	$650,516
ND HIGHWAY PATROL	Office Location	600 E Blvd Ave	Bismarck	$910,500
ND PROTECTION AND ADVOCACY PROJECT	Office Property	311 S 4th St #112	Grand Forks	$20,000
BISMARCK COMMUNITY BOWL	S Grandstand	1701 Canary Ave	Bismarck	$482,041
ND OFFICE OF STATE TAX COMMISSIONER	Office Property	900 E Blvd Ave	Bismarck	$34,236
ND CENTRAL SERVICES DIVISION	Procurement*	600 E Blvd Ave	Bismarck	$138,906
AUDITOR, OFFICE OF THE STATE	Office Contents	1655 43rd St S-Ste 203	Fargo	$85,713

Description	Building Name	Address	City	Insured Amount
DOT HIGHWAY DEPARTMENT	Kiosk @ StaMart Travel Center	3500 12 Avenue	North Fargo	$132,000
ND ENVIRONMENTAL QUALITY DEPARTMENT	Monitor Site	46:56:01 N 96:51:17 W	Fargo	$150,926
ND SUPREME COURT	Grand Forks Co Office Property	124 S 4th St	Grand Forks	$485,660
ATTORNEY GENERAL, OFFICE OF THE	AG/FinAdmin/CivLit/NatRes	500 North 9th St	Bismarck	$301,100
ND HIGHWAY PATROL	Office Location	608 E Blvd Ave	Bismarck	$132,140
ND HOUSING FINANCE AGENCY	Office Furniture & Equipment	624 Main Ave, Suite 12	Fargo	$28,739
ND PROTECTION AND ADVOCACY PROJECT	Office Property	4025 9th Ave S #A	Fargo	$30,000
ND STATE SEED DEPARTMENT	Seed Potato Stock	1325 18th St North	Fargo	$285,120
BISMARCK COMMUNITY BOWL	4-Stadium Lights	1701 Canary Ave	Bismarck	$241,021
ND OFFICE OF STATE TAX COMMISSIONER	Office Property	221 University Ave Ste 2	Williston	$6,975
BISMARCK STATE COLLEGE	Mandan Lineworker Office/Classroom	3201 Nygren Dr	Mandan	$781,080
LEGAL COUNSEL FOR INDIGENTS	Office Property	410 E Thayer, Ste 201	Bismarck	$60,410
MINOT STATE UNIVERSITY	Scoreboard	500 University Ave W	Minot	$730,158
ND CENTRAL SERVICES DIVISION	Surplus Property State Inventory	1278 Hemlock St Igoe Bldg #12	Bismarck	$65,197
ND DEPT OF PUBLIC INSTRUCTION	Office Property	3rd St NE	Mayville	$10,489
DOT HIGHWAY DEPARTMENT	Kiosk @ Cash Wise	1761 3rd Avenue W	Dickinson	$132,000
ND ENVIRONMENTAL QUALITY DEPARTMENT	Monitor Site	512 4th Ave E	Williston	$53,490
MINERAL RESOURCES (G. S.), DEPT OF	Office Contents	612 E Blvd Ave	Bismarck	$344,477
ND SUPREME COURT	Burleigh Co Office Property	514 E Thayer Ave	Bismarck	$599,835
DOT MTCE & ENG SERVICES/RADIO	1000 Gallon Propane Tank	3442 134th Ave NW	Arnegard	$4,512
ND ATMOSPHERIC RESOURCE BOARD	Office Equipment	14011 86th St SW	Bowman	$10,714
ND PROTECTION AND ADVOCACY PROJECT	Office Property	2605 Circle Dr/LRC Bldg/4th Floor	Jamestown	$30,000
ND STATE RADIO COMMUNICATIONS	Bismarck Radio Equipment	600 E Blvd Ave	Bismarck	$186,342
ND STATE SEED DEPARTMENT	Seed Bank Stock	1325 18th St North	Fargo	$28,512
BISMARCK COMMUNITY BOWL	8-West Field Lights	1701 Canary Ave	Bismarck	$234,132

Description	Building Name	Address	City	Insured Amount
ND OFFICE OF STATE TAX COMMISSIONER	Office Property	1407 24th Ave S	Grand Forks	$12,238
LEGAL COUNSEL FOR INDIGENTS	Office Property	912 3rd Ave S	Fargo	$61,033
ND CENTRAL SERVICES DIVISION	Loading/Unloading Ramp	1278 Hemlock St Igoe Bldg #12	Bismarck	$19,380
CASSELTON RESEARCH CENTER	Grain Handling Complex	15449 37th Street SE	Casselton	$18,045
DOT HIGHWAY DEPARTMENT	Kiosk @ Cash Wise	3208 16th St SW Minot	Minot	$132,000
ND ENVIRONMENTAL QUALITY DEPARTMENT	Monitor Site	1810 N 16th ST	Bismarck	$298,905
ND SUPREME COURT	Ramsey Co Office Property	524 4th Ave	Devils Lake	$213,559
ATTORNEY GENERAL, OFFICE OF THE	BCI Office	301 Smith Dr SW	Devils Lake	$38,600
ND WORKFORCE SAFETY & INSURANCE	WSI Office	66 Osborn Dr	Dickinson	$7,618
ND HIGHWAY PATROL	Office Location	223 E Broadway, Ste 304	Williston	$172,000
ND DEPT OF FACILITY MANAGEMENT	Cafeteria Equipment	600 E Blvd Ave	Bismarck	$121,377
ND STATE RADIO COMMUNICATIONS	New Salem Radio Equipment	4325 45th Ave	New Salem	$215,009
BISMARCK COMMUNITY BOWL	2-Football Goal Post	1701 Canary Ave	Bismarck	$4,820
ND OFFICE OF STATE TAX COMMISSIONER	Office Property	604 E Blvd Ave	Jamestown	$158,455
ND DEPT OF HUMAN SERVICES	LRHSC @ Devils Lake	200 Hwy 2 SW	Devils Lake	$646,695
DOT HIGHWAY DEPARTMENT	Kiosk @ StaMart	1212 N 47th ST	Grand Forks	$132,000
ND ENVIRONMENTAL QUALITY DEPARTMENT	Monitor Site	NW4 NE4 Sec 13-144-88	Beulah	$172,586
MINERAL RESOURCES (G. S.), DEPT OF	Storage Rental	3801 Saratoga Ave	Bismarck	$90,435
ND SUPREME COURT	Ward Co Office Property	315 3rd St SE	Minot	$629,871
ATTORNEY GENERAL, OFFICE OF THE	BCI/FM Office	374 34th St S, Suite B	Fargo	$196,900
ND VISION SERVICES	8-Lot Poles with Lights	500 Stanford Rd	Grand Forks	$10,072
ND WORKFORCE SAFETY & INSURANCE	WSI Office	300 2nd Ave NE Ste 215	Jamestown	$12,634
ND HIGHWAY PATROL	Office Location	2201 6 St SE, Ste B	Minor	$132,299
ND PROTECTION AND ADVOCACY PROJECT	Office Property	103 1st Ave West #104	Dickinson	$10,000
ND STATE RADIO COMMUNICATIONS	Raleigh Radio Equipment	4195 76th St	Raleigh	$215,009
ND OFFICE OF STATE TAX COMMISSIONER	Office Property	5308 Niagara Dr	Bismarck	$1,332

Description	Building Name	Address	City	Insured Amount
WILLISTON RESEARCH CENTER	7-2200 Bushel Bins with Aeration	14120 Hwy 2	Williston	$84,239
CENTRAL GRASSLANDS RESEARCH CENTER	Grain Bin	4824 48th Ave SE	Streeter	$713
CASSELTON RESEARCH CENTER	2-Grain Bins*	15449 37th Street SE	Casselton	$5,875
ND DEPT OF HUMAN SERVICES	Grand Forks County Building	151 S 4th St Suite 401	Grand Forks	$1,336,022
DOT HIGHWAY DEPARTMENT	Kiosk @ Cash Wise	300 11th Street W	Williston	$132,000
ND ENVIRONMENTAL QUALITY DEPARTMENT	Monitoring Tower	46:56:01 N 96:51:17 W	Fargo	$14,445
ND SUPREME COURT	Stutsman Co Office Property	511 2nd Ave SE	Jamestown	$152,645
DOT MTCE & ENG SERVICES/RADIO	1000 Gallon Propane Tank	6870 62nd Ave SW	Blaisdell	$4,512
ND VISION SERVICES	2-Signs	500 Stanford Rd	Grand Forks	$1,133
ND HIGHWAY PATROL	Office Location	318 W Walnut St	Devils Lake	$89,500
ND PROTECTION AND ADVOCACY PROJECT	Office Property	828 W Chapel Drive	Grafton	$10,000
ND STATE RADIO COMMUNICATIONS	Hannover Radio Equipment	1575 Hwy 31	Hannover	$186,342
BISMARCK COMMUNITY BOWL	West Field Scoreboard	1701 Canary Ave	Bismarck	$11,707
ND OFFICE OF STATE TAX COMMISSIONER	Office Property	4807 Fountain Blue Dr	Bismarck	$1,332
LEGAL COUNSEL FOR INDIGENTS	Office Property	223 4th Ave NE STE B	Devils Lake	$15,000
CENTRAL GRASSLANDS RESEARCH CENTER	Grain Bin	4824 48th Ave SE	Streeter	$713
DOT HIGHWAY DEPARTMENT	Kiosk @ Kum & Go	308 Adams Ave	Hettinger	$132,000
ND ENVIRONMENTAL QUALITY DEPARTMENT	Monitoring Tower	NW 4 NE4 Sec 13-144-88	Beulah	$4,275
MINERAL RESOURCES (G. S.), DEPT OF	Office Contents	1500 Edwards Ave	Bismarck	$48,001
ND SUPREME COURT	Stark Co Office Property	51 3rd St E 3rd Floor	Dickinson	$302,377
ATTORNEY GENERAL, OFFICE OF THE	BCI Office	638 Cooper Ave	Grafton	$11,500
ND VISION SERVICES	Playground Equipment	500 Stanford Rd	Grand Forks	$26,973
ND WORKFORCE SAFETY & INSURANCE	WSI Office	422 1st Ave W	Williston	$14,092
ND HIGHWAY PATROL	Office Location	1100 N 47th St Ste 200	Grand Forks	$221,776
ND DEPT OF FACILITY MANAGEMENT	Facility Management Office	Judicial Wing/600 E Blvd Ave	Bismarck	$66,176
ND PROTECTION AND ADVOCACY PROJECT	Office Property	400 E Broadway Suite 409	Bismarck	$140,000

Description	Building Name	Address	City	Insured Amount
ND STATE RADIO COMMUNICATIONS	Dickinson Radio Equipment	4720 117 R Ave SW	Dickinson	$186,342
BISMARCK COMMUNITY BOWL	West Field Scoreboard	1701 Canary Ave	Bismarck	$11,707
ND OFFICE OF STATE TAX COMMISSIONER	Office Property	2115 E Ave F	Bismarck	$1,332
LEGAL COUNSEL FOR INDIGENTS	Office Property	311 South 4th St #102	Grand Forks	$43,187
DOT HIGHWAY DEPARTMENT	Kiosk @ Grant County Recorder	106 2nd Ave NE	Carson	$132,000
ND ENVIRONMENTAL QUALITY DEPARTMENT	Monitor Site	47:11:09 N 101:25:41 W	Hannover	$95,847
MINERAL RESOURCES (G. S.), DEPT OF	Office Contents	1016 E Calgary	Bismarck	$971,700
DOT MTCE & ENG SERVICES/RADIO	1000 Gallon Propane Tank	10605 Sjule Road	Bottineau	$4,512
ATTORNEY GENERAL, OFFICE OF THE	BCI/FM Office	1674 15th St W Suite 5 & 6	Dickinson	$98,500
ND WORKFORCE SAFETY & INSURANCE	DRO Office	1611 E Century Ave, Suite 402	Bismarck	$32,754
ND HIGHWAY PATROL	Office Location	374 34 St S, Ste A	Fargo	$154,642
ND PROTECTION AND ADVOCACY PROJECT	Office Property	1015 Hospital Road #F	Belcourt	$10,000
ND STATE RADIO COMMUNICATIONS	Mott Radio Equipment	Sec 21-132-95	Mott	$215,009
BISMARCK COMMUNITY BOWL	3-Public Address Horns	1701 Canary Ave	Bismarck	$26,984
ND OFFICE OF STATE TAX COMMISSIONER	Office Property	125 Irvine Loop Apt 2309	Bismarck	$1,332
DOT HIGHWAY DEPARTMENT	Kiosk @ Grand Forks Cities Mall	1726 S Washington St Ste 55	Grand Forks	$132,000
MINERAL RESOURCES (O & G), DEPT OF	Office @ UND	Campus Road & Cornell St	Grand Forks	$5,052
ND ENVIRONMENTAL QUALITY DEPARTMENT	Monitor Site	North Unit of TRN Park	Medora	$88,252
ND SUPREME COURT	Cass Co JC Office Property	1010 2nd Ave S	Fargo	$138,920
ATTORNEY GENERAL, OFFICE OF THE	BCI/TF Office	205 6th St SE, Suite 105	Jamestown	$41,912
ND HIGHWAY PATROL	Office Location	205 6th St SE	Jamestown	$132,000
ND ATMOSPHERIC RESOURCE BOARD	Auxiliary Power Unit	6135 82nd Ave NW	Stanley	$5,465
ND STATE RADIO COMMUNICATIONS	Bowman Radio Equipment	8557 147th Ave SW	Bowman	$215,009
ND OFFICE OF STATE TAX COMMISSIONER	Office Property	3009 Bayside Dr SE	Mandan	$1,332
DOT HIGHWAY DEPARTMENT	Kiosk @ Jason's Super Foods	211 Main St S	Crosby	$132,000
MINERAL RESOURCES (O & G), DEPT OF	Office @ State Capitol	10th Floor	Bismarck	$81,853

Description	Building Name	Address	City	Insured Amount
ND ENVIRONMENTAL QUALITY DEPARTMENT	Painted Canyon Monitor Site	East of Medora	Medora	$32,192
ND SUPREME COURT	Bottineau Co Office Property	314 West 5th St	Bottineau	$105,254
DOT MTCE & ENG SERVICES/RADIO	1000 Gallon Propane Tank	8557 147th Ave SW	Bowman	$4,512
ATTORNEY GENERAL, OFFICE OF THE	BCI Office - 3rd Floor	223 E Broadway	Williston	$53,800
ND WORKFORCE SAFETY & INSURANCE	3-Flagpoles	1600 E Century Ave	Bismarck	$8,113
ND HIGHWAY PATROL	Office Location	1812 Lee Avenue	Bismarck	$4,105,228
ND STATE RADIO COMMUNICATIONS	Sentinel Butte Radio Equipment	150 1st Ave SE	Sentinel Butte	$215,009
ND OFFICE OF STATE TAX COMMISSIONER	Office Property	2914 Manchester St	Bismarck	$1,332
WILLISTON RESEARCH CENTER	1600 Bushel Bin with Aeration	14120 Hwy 2	Williston	$8,748
LAKE REGION STATE COLLEGE	Contents @ GFAB Ed Center #252	344 Tuskegee Airmen Blvd	Grand Forks	$118,029
CARRINGTON RESEARCH CENTER	3-2000 Bushel Grain Bins*	663 Hwy 281 NE	Carrington	$2,518
ND DEPT OF HUMAN SERVICES	NEHSC Outreach @ Grafton	5th & School Road	Grafton	$156,045
DOT HIGHWAY DEPARTMENT	Kiosk @ Home of Economy	113 6th Ave SE 5200	Watford City	$132,000
ND ENVIRONMENTAL QUALITY DEPARTMENT	Lostwood Monitor Site	West of Lostwood	Lostwood	$128,549
ND SUPREME COURT	Walsh Co Office Property	600 Cooper Ave	Grafton	$124,343
ATTORNEY GENERAL, OFFICE OF THE	BCI/TF Office	1100 N 47th St Suite 100	Grand Forks	$90,200
HETTINGER RESEARCH CENTER	6-3500 Bushel Grain Bins	102 1/2 Hwy 12 W	Hettinger	$77,223
ND WORKFORCE SAFETY & INSURANCE	6-Outdoor Benches	1600 E Century Ave	Bismarck	$9,686
ND HIGHWAY PATROL	Office Location	1700 3rd Ave W, Ste 102	Dickinson	$156,000
ND STATE RADIO COMMUNICATIONS	Killdeer Radio Equipment	Sec 34-147-96	Killdeer	$215,009
WILLISTON RESEARCH CENTER	3500 Bu Westeel Bin w/cone addn	14120 Hwy 2	Williston	$18,998
CASSELTON RESEARCH CENTER	Grain Handling Complex	15449 37th Street SE	Casselton	$279,619
DOT HIGHWAY DEPARTMENT	Kiosk @ Petro Serve USA	810 11th St SW	Valley City	$132,000
MINERAL RESOURCES (O & G), DEPT OF	Warehouse @ Bismarck	3801 Saratoga Ave	Bismarck	$12,403
ND ENVIRONMENTAL QUALITY DEPARTMENT	Cold Storage Building	2639 E Main ST	Bismarck	$9,363

Description	Building Name	Address	City	Insured Amount
ND SUPREME COURT	Grand Forks Co Office Property	201 South 4th St	Grand Forks	$103,822
DOT MTCE & ENG SERVICES/RADIO	1000 Gallon Propane Tank	450 58th Ave SE	Carrington	$4,512
ATTORNEY GENERAL, OFFICE OF THE	BCI/FM Office	3416 N Broadway	Minot	$175,900
ND WORKFORCE SAFETY & INSURANCE	2-Large Site Signs	1600 E Century Ave	Bismarck	$15,031
ND UNIVERSITY SYSTEM	NDUS Office Property	1500 Edwards Ave	Bismarck	$18,285
ND STATE RADIO COMMUNICATIONS	Arnegard Radio Equipment	3442 134th Ave NW	Arnegard	$215,009
LAKE REGION STATE COLLEGE	LRSC Nursing Center	1425 South Columbia Rd	Grand Forks	$73,330
ND HISTORICAL SOCIETY	Field Office Quarters Property	15349 39th Lane NW	Williston	$4,197
ND DEPT OF HUMAN SERVICES	SCHSC @ Jamestown	520 3rd St NW	Jamestown	$1,024,027
DOT HIGHWAY DEPARTMENT	Kiosk @ Leevers Foods	176 4th Ave S	Carrington	$132,000
MINERAL RESOURCES (O & G), DEPT OF	Office @ Bismarck	1016 E Calgary	Bismarck	$1,236,460
ND ENVIRONMENTAL QUALITY DEPARTMENT	Bismarck Lab and Addition	2635 East Main	Bismarck	$4,419,225
ND SUPREME COURT	Williams Co Office Property	205 E Broadway	Williston	$355,260
ND WORKFORCE SAFETY & INSURANCE	3-Small Site Signs	1600 E Century Ave	Bismarck	$11,269
ND STATE RADIO COMMUNICATIONS	Williston Radio Equipment	12737 48th St NW	Williston	$186,342
BISMARCK COMMUNITY BOWL	Chain Link Fence	1701 Canary Ave	Bismarck	$80,959
ND DEPT OF HUMAN SERVICES	BLHSC @ Dickinson	1463 1-94 Business Loop E	Dickinson	$904,953
DOT HIGHWAY DEPARTMENT	Kiosk @ Home of Economy	225 US-2	Rugby	$132,000
MINERAL RESOURCES (O & G), DEPT OF	Office @ Bismarck	500 N 9th St	Bismarck	$1,397
ND ENVIRONMENTAL QUALITY DEPARTMENT	Air Monitoring Site	47.940861/101.571583	Ryder	$35,101
DOT MTCE & ENG SERVICES/RADIO	1000 Gallon Propane Tank	10188 138th Ave SE	Cayuga	$4,512
ND WORKFORCE SAFETY & INSURANCE	4-Anchored Trash Receptacles	1600 E Century Ave	Bismarck	$7,550
ND WATER COMMISSION	Richardton Reservoir	SW4 SW4 Sec 29-140-92	Richardton	$1,074,008
ND DEPT OF CORRECTIONS & REHABILITATION	Penitentiary Security Fencing	3100 Railroad Ave	Bismarck	$1,322,188
ND STATE RADIO COMMUNICATIONS	Tioga Radio Equipment	6143 103rd Ave NW	Tioga	$215,009

Description	Building Name	Address	City	Insured Amount
ND VETERANS HOME	Flag Poles	1600 Veterans Dr	Lisbon	$9,758
NORTH CENTRAL RESEARCH CENTER	4-1600 Bushel Bins	5400 Hwy 83 South	Minot	$24,746
DOT HIGHWAY DEPARTMENT	Kiosk @ Do It Best	500 Division Ave S Ste 1	Cavalier	$132,000
MINERAL RESOURCES (O & G), DEPT OF	Office @ Minot	7 3rd St SE #204	Minot	$55,207
ND SUPREME COURT	Morton Co Office Property	210 2nd Ave NW	Mandan	$205,904
ND WORKFORCE SAFETY & INSURANCE	108-Detached Exterior Light Fixtures	1600 E Century Ave	Bismarck	$115,000
MAYVILLE STATE UNIVERSITY	Rented Warehouse	40 1st St NE	Mayville	$251,628
ND DEPT OF CORRECTIONS & REHABILITATION	28,000 x 34' Razor Wire	3100 Railroad Ave	Bismarck	$517,501
ND STATE RADIO COMMUNICATIONS	Fortuna Radio Equipment	Sec 34-162-101	Fortuna	$215,009
ND VETERANS HOME	Main St Sign	Main St	Lisbon	$2,709
WILLISTON RESEARCH CENTER	2200 Bushel Hopper Bin	14120 Hwy 2	Williston	$10,340
NORTH CENTRAL RESEARCH CENTER	4-2482 Bushel Bins	5400 Hwy 83 South	Minot	$46,700
DOT HIGHWAY DEPARTMENT	Kiosk @ City Community Center	153 E Main Street	Beach	$132,000
ND SUPREME COURT	Adams Co Office Property	602 Adams Ave	Hettinger	$18,396
DOT MTCE & ENG SERVICES/RADIO	1000 Gallon Propane Tank	3229 64R Ave SE	Cleveland	$4,512
ND WORKFORCE SAFETY & INSURANCE	3-Anchored Tables	1600 E Century Ave	Bismarck	$2,921
ND WATER COMMISSION	Zap Reservoir #1/Antenna	101 County Road 13	Zap	$730,701
ND ATMOSPHERIC RESOURCE BOARD	2 Steel Cargo Containers	2901 E Main Ave	Bismarck	$112,460
ND STATE RADIO COMMUNICATIONS	Columbus Radio Equipment	8934 Hwy 40	Powers Lake	$215,009
MINOT STATE UNIVERSITY	Stadium Seating	500 University Ave W	Minot	$1,581,054
WILLISTON RESEARCH CENTER	3-1500 Hopper Bins	14120 Hwy 2	Williston	$21,474
CENTRAL GRASSLANDS RESEARCH CENTER	4-Grain Bins @ Iszler Farm	4647 47th Ave SE	Streeter	$1,092
DOT HIGHWAY DEPARTMENT	Kiosk @ Post's Hardware	613 Main Ave S	Hankinson	$132,000
ND SUPREME COURT	Barnes Co Office Property	230 4th St NW	Valley City	$142,518
ATTORNEY GENERAL, OFFICE OF THE	BCI Office	413 3rd Ave North	Wahpeton	$11,440
ND WORKFORCE SAFETY & INSURANCE	3-Carousel Bike Racks	1600 E Century Ave	Bismarck	$734

Description	Building Name	Address	City	Insured Amount
LANGDON RESEARCH CENTER	2310 Bu Hopper Bin with Auger -1	9280 107th Ave NE	Langdon	$11,800
ND ATMOSPHERIC RESOURCE BOARD	Steele Cargo Container	6135 82nd Ave NW	Stanley	$22,535
ND STATE RADIO COMMUNICATIONS	Blaisdell Radio Equipment	6870 62nd Ave SW	Blaisdell	$186,342
WILLISTON RESEARCH CENTER	1700 Bushel Bin with Aeration	14120 Hwy 2	Williston	$9,545
DOT HIGHWAY DEPARTMENT	Kiosk @ Chamber Office	1505 11th St N	Wahpeton	$132,000
ND SUPREME COURT	Richland Co Office Property	418 2nd Ave N	Wahpeton	$129,306
DOT MTCE & ENG SERVICES/RADIO	1000 Gallon Propane Tank	8934 Hwy 40	Columbus	$4,512
ND WORKFORCE SAFETY & INSURANCE	1-Anchored Bike Rack	1600 E Century Ave	Bismarck	$426
ND WATER COMMISSION	Dickinson Reservoir/Antenna	NE4 Sec 4-139-95	Dickinson	$984,850
LANGDON RESEARCH CENTER	1000 Bu Hopper Bin with Auger - 2	9280 107th Ave NE	Langdon	$7,300
MAYVILLE STATE UNIVERSITY	2-Sets of Bleachers	Stan Dakken Dr	Mayville	$108,813
ND ATMOSPHERIC RESOURCE BOARD	Chemical in Watford City	300 12th St NE	Watford City	$44,087
ND STATE RADIO COMMUNICATIONS	Minot Radio Equipment	1521 54th Ave SW	Minot	$186,342
BISMARCK COMMUNITY BOWL	North Parking Lot Light Fixtures	1701 Canary Ave	Bismarck	$84,924
CENTRAL GRASSLANDS RESEARCH CENTER	Holding Pens	4824 48th Ave SE	Streeter	$12,313
DOT HIGHWAY DEPARTMENT	Kiosk @ White Buffalo Foods	112 Yates St	Fort Yates	$132,000
ND SUPREME COURT	Richland Co JC Office Property	413 N 3rd Ave	Wahpeton	$13,601
ND FOREST SERVICE	Office Property	916 E Interstate Ave	Bismarck	$98,769
ND WORKFORCE SAFETY & INSURANCE	24-Security Bollards	1600 E Century Ave	Bismarck	$11,494
ND WATER COMMISSION	Zap Reservoir #2	101 County Road 13	Zap	$655,197
ND HEALTH DEPARTMENT	Capitol Tower/Basement/Judicial Wing	600 E Blvd Ave	Bismarck	$1,668,443
LANGDON RESEARCH CENTER	1000 Bu Hopper Bin with Auger - 3	9280 107th Ave NE	Langdon	$7,300
MAYVILLE STATE UNIVERSITY	Scoreboard	Stan Dakken Dr	Mayville	$20,090
ND ATMOSPHERIC RESOURCE BOARD	Chemicals in Williston	14151 Commerce Dr	Williston	$19,824
ND STATE RADIO COMMUNICATIONS	Ryder Radio Equipment	28301 184th St SW	Ryder	$215,009

Description	Building Name	Address	City	Insured Amount
CENTRAL GRASSLANDS RESEARCH CENTER	Sorting Pens	4824 48th Ave SE	Streeter	$1,497
NORTH CENTRAL RESEARCH CENTER	6-2450 Bushel Bins	5400 Hwy 83 South	Minot	$56,840
DOT HIGHWAY DEPARTMENT	Kiosk @ McLean County Courthouse	712 5th Ave	Washburn	$132,000
ND SUPREME COURT	Pembina Co Office Property	301 Dakota St W	Cavalier	$72,749
DOT MTCE & ENG SERVICES/RADIO	1000 Gallon Propane Tank	1381 Hwy 14 NE	Denhoff	$4,512
ND FOREST SERVICE	Office Property @ DCB	307 First St E	Bottineau	$31,168
ATTORNEY GENERAL, OFFICE OF THE	HIDTA (BCI/US Attorney)	220 E Rosser Room 372	Bismarck	$11,440
ND WORKFORCE SAFETY & INSURANCE	Outside Drop Box	1600 E Century Ave	Bismarck	$933
ND WATER COMMISSION	Davis Buttes Reservoir/Antenna	NE4 Sec 25-140-97	Dickinson	$667,619
LANGDON RESEARCH CENTER	1000 Bu Hopper Bin with Auger - 4	9280 107th Ave NE	Langdon	$7,300
MAYVILLE STATE UNIVERSITY	2-Goal Posts	Stan Dakken Dr	Mayville	$6,695
ND STATE RADIO COMMUNICATIONS	Dogden Radio Equipment	2791 8th Ave NW	Butte	$215,009
BISMARCK COMMUNITY BOWL	Scoreboard & Posts	1701 Canary Ave	Bismarck	$555,824
WILLISTON RESEARCH CENTER	2-4000 Bu Grain Max Bins	14120 Hwy 2	Williston	$34,785
CENTRAL GRASSLANDS RESEARCH CENTER	Hopper Bin	4824 48th Ave SE	Streeter	$1,260
NORTH CENTRAL RESEARCH CENTER	2-4200 Bushel Bins	5400 Hwy 83 South	Minot	$32,480
DOT HIGHWAY DEPARTMENT	Kiosk @ Post Office	220 Main St S	McClusky	$132,000
ND SUPREME COURT	Cavalier Co Office Property	901 3rd St	Langdon	$18,196
ATTORNEY GENERAL, OFFICE OF THE	BCI Office	110 Industrial Road	Rugby	$13,520
HETTINGER RESEARCH CENTER	7-800 Bushel H Bins/Augers/Motors	102 1/2 Hwy 12 W	Hettinger	$45,552
ND WATER COMMISSION	New England Reservoir #1/Antenna	SE4 Sec 11-136-97	New England	$823,329
LANGDON RESEARCH CENTER	1000 Bu Hopper Bin with Auger - 5	9280 107th Ave NE	Langdon	$7,300
ND STATE RADIO COMMUNICATIONS	Bottineau Radio Equipment	10605 Sjule Road	Bottineau	$215,009
BISMARCK COMMUNITY BOWL	Game Clock & Posts	1701 Canary Ave	Bismarck	$1,397
WILLISTON RESEARCH CENTER	Friesen 2000 Bu Bin	5154 112th Ave NW	Ray	$9,884
NORTH CENTRAL RESEARCH CENTER	7-2300 Bushel Bins	5400 Hwy 83 South	Minot	$62,253

Description	Building Name	Address	City	Insured Amount
DOT HIGHWAY DEPARTMENT	Kiosk @ Farmers Union Oil Co	49211 Highway 52 N	Kenmare	$132,000
ND SUPREME COURT	McHenry Co Office Property	407 Main	Towner	$53,574
DOT MTCE & ENG SERVICES/RADIO	1000 Gallon Propane Tank	7747 Ephraim Hill Road W	Devils Lake	$4,512
HETTINGER RESEARCH CENTER	4-2000 Bushel H Bins/Augers/Motors	102 1/2 Hwy 12 W	Hettinger	$37,020
ND WATER COMMISSION	Halliday Reservoir/Antenna	SW4 Sec 22-144-92	Halliday	$264,950
LANGDON RESEARCH CENTER	2310 Bu Hopper Bin with Auger - 6	9280 107th Ave NE	Langdon	$11,800
ND SCHOOL FOR THE DEAF	Fargo Outreach/Parent Infant Program	1621 S University Dr	Fargo	$11,678
ND DEPT OF FACILITY MANAGEMENT	99-Poles with Lights	Capitol Complex	Bismarck	$315,681
ND STATE RADIO COMMUNICATIONS	Mylo Radio Equipment	4681 87th St NE	Mylo	$186,342
WILLISTON RESEARCH CENTER	26' High Tunnel Greenhouse	5154 112th Ave NW	Ray	$8,311
ND DEPT OF HUMAN SERVICES	Bismarck - DHS Capitol	2nd & 3rd - Judicial Wing	Bismarck	$1,640,258
DOT HIGHWAY DEPARTMENT	Kiosk @ Jason's Super Foods	975 Eagle Dr	New Town	$132,000
ND SUPREME COURT	Bowman Co Office Property	104 1st St NW	Bowman	$15,464
ATTORNEY GENERAL, OFFICE OF THE	Task Force Office	250 N 31st St Suite 4	Bismarck	$29,100
LANGDON RESEARCH CENTER	2778 Bu Hopper Bin with Auger - 7	9280 107th Ave NE	Langdon	$19,752
ND SCHOOL FOR THE DEAF	Minot Outreach/Parent Infant Program	500 University Ave W	Minot	$6,289
ND STATE RADIO COMMUNICATIONS	Devils Lake Radio Equipment	7747 Ephraim Hill Road W	Devils Lake	$186,342
DOT HIGHWAY DEPARTMENT	Kiosk @ One-Stop	8 N Main St	Gwinner	$132,000
ND SUPREME COURT	Pierce Co Office Property	240 2nd St SE	Rugby	$46,506
DOT MTCE & ENG SERVICES/RADIO	1000 Gallon Propane Tank	4720 117 R Ave SW	Dickinson	$4,512
ATTORNEY GENERAL, OFFICE OF THE	BCI - SLIC Fusion Center	432 Fraine Barracks Lane	Bismarck	$107,100
HETTINGER RESEARCH CENTER	3000 Bushel Bin	102 1/2 Hwy 12 W	Hettinger	$11,569
ND WATER COMMISSION	Bucyrus Reservoir/Antenna	NE4 Sec 29-130-97	Bucyrus	$625,974
LANGDON RESEARCH CENTER	2729 Bu Hopper Bin with Auger - 8	9280 107th Ave NE	Langdon	$15,990
MAYVILLE STATE UNIVERSITY	Playground Equipment	Stan Dakken Dr	Mayville	$6,610
ND SCHOOL FOR THE DEAF	Bismarck Outreach/Parent Infant Prg	418 East Broadway Ave Suite 228	Bismarck	$59,526

Description	Building Name	Address	City	Insured Amount
ND STATE RADIO COMMUNICATIONS	Milton Radio Equipment	12322 Hwy 66	Milton	$186,342
BISMARCK COMMUNITY BOWL	4-Courtyard Lights	1701 Canary Ave	Bismarck	$7,982
BISMARCK STATE COLLEGE	Electronic Sign	Corner of Schafer St & College Dr	Bismarck	$143,983
CENTRAL GRASSLANDS RESEARCH CENTER	Hopper Bin	4824 48th Ave SE	Streeter	$1,260
NORTH CENTRAL RESEARCH CENTER	7-4120 Bushel Bins	5400 Hwy 83 South	Minot	$130,086
DOT HIGHWAY DEPARTMENT	Kiosk @ Lisbon Treasurer	204 5th Ave W	Lisbon	$132,000
ND SUPREME COURT	Rolette Co Office Property	102 NE 2nd	Rolla	$92,427
ND WATER COMMISSION	Bucyrus Booster/Telemetry	SE4 Sec 16-138-97	Bucyrus	$594,548
ND HIGHWAY PATROL	Scale/Load Cells/Equipment	1305 US Hwy 2 Bypass	Minot	$51,407
LANGDON RESEARCH CENTER	2778 Bu Hopper Bin with Auger - 9	9280 107th Ave NE	Langdon	$15,194
MAYVILLE STATE UNIVERSITY	HeadStart Program Equipment	113 5th St S	Aneta	$11,016
ND STATE RADIO COMMUNICATIONS	Grand Forks Radio Equipment	8500 55th St N	Grand Forks	$186,342
BISMARCK COMMUNITY BOWL	Entrance Fence	1701 Canary Ave	Bismarck	$22,419
ND STATE COLLEGE OF SCIENCE	Scoreboard	14th Ave North	Wahpeton	$29,462
CENTRAL GRASSLANDS RESEARCH CENTER	Hopper Bin	4824 48th Ave SE	Streeter	$1,260
DOT HIGHWAY DEPARTMENT	Kiosk @ Z's Fresh Market	121 1st St N	Ellendale	$132,000
ND SUPREME COURT	McKenzie Co Office Property	201 5th St NW	Watford City	$150,160
DOT MTCE & ENG SERVICES/RADIO	1000 Gallon Propane Tank	2791 8th Ave NW	Butte	$4,512
ND FOREST SERVICE	Office Property	3.5 Miles N Hwy 281	Carrington	$10,720
ND HIGHWAY PATROL	Scale/Load Cells/Equipment	Hwy 81 N	Grand Forks	$51,407
LANGDON RESEARCH CENTER	5000 Bu Hopper Bin with Auger - 10	9280 107th Ave NE	Langdon	$17,500
MAYVILLE STATE UNIVERSITY	HeadStart Program Equipment	408 1st SE	Hillsboro	$39,659
ND DEPT OF FACILITY MANAGEMENT	3-1000 kw & 1-1250 kw Generators	600 E Blvd Ave	Bismarck	$3,526,581
ND STATE RADIO COMMUNICATIONS	Petersburg Radio Equipment	4014 123rd Ave NE	Petersburg	$215,009
BISMARCK COMMUNITY BOWL	226 LF Black Deco Railing	1701 Canary Ave	Bismarck	$23,606
BISMARCK STATE COLLEGE	174-Campus Lights	Throughout Campus	Bismarck	$798,812

Description	Building Name	Address	City	Insured Amount
CARRINGTON RESEARCH CENTER	2-1500 Bushel Grain Bins	663 Hwy 281 NE	Carrington	$1,260
DOT HIGHWAY DEPARTMENT	Kiosk @ Cash Wise	410 10th St SE	Jamestown	$132,000
ND SUPREME COURT	Mountrail Co Office Property	101 North Main	Stanley	$49,874
ND FOREST SERVICE	Sheyenne Forest Sign	Hwy 32 South	Lisbon	$1,189
ND WATER COMMISSION	Jung Lake Reservoir/Telemetry	SE4 Sec 28-134-97	New England	$1,444,500
LANGDON RESEARCH CENTER	1100 Bu Hopper Bin with Auger - 11	9280 107th Ave NE	Langdon	$4,850
MAYVILLE STATE UNIVERSITY	Playground Equipment	408 1st SE	Hillsboro	$4,408
ND DEPT OF FACILITY MANAGEMENT	1500 kw Generator	600 E Blvd Ave	Bismarck	$493,129
ND STATE RADIO COMMUNICATIONS	Finley Radio Equipment	400 Lincoln Ave	Finley	$215,009
BISMARCK COMMUNITY BOWL	2-Marquee Signs	1701 Canary Ave	Bismarck	$55,408
BANK OF NORTH DAKOTA	2009 Exterior Sign (Green Sign)	1200 Memorial Hwy	Bismarck	$24,828
CARRINGTON RESEARCH CENTER	1-1000 Bushel Grain Bin	663 Hwy 281 NE	Carrington	$420
ND DEPT OF HUMAN SERVICES	NEHSC - Residential Center @ Grand Forks	770 South 14th	Grand Forks	$110,190
DOT HIGHWAY DEPARTMENT	Kiosk @ City Hall	225 Lake Ave W	Napoleon	$132,000
ND SUPREME COURT	Divide Co Office Property	200 N Main	Crosby	$25,365
DOT MTCE & ENG SERVICES/RADIO	1000 Gallon Propane Tank	1855 29 St SE	Driscoll	$4,512
ND HIGHWAY PATROL	Scale/Load Cells/Equipment	US Hwy 2 West	Devils Lake	$51,407
LANGDON RESEARCH CENTER	1400 Bu Hopper Bin with Auger - 12	9280 107th Ave NE	Langdon	$5,900
ND STATE RADIO COMMUNICATIONS	West Fargo Radio Equipment	1915 Main Ave W	West Fargo	$186,342
BISMARCK COMMUNITY BOWL	Trellis	1701 Canary Ave	Bismarck	$23,116
BISMARCK STATE COLLEGE	3-Flagpoles	1500 Edwards Ave	Bismarck	$14,163
CARRINGTON RESEARCH CENTER	1-600 Bushel Hopper Bin	663 Hwy 281 NE	Carrington	$503
DOT HIGHWAY DEPARTMENT	Kiosk @ Marketplace Foods	1600 2nd Ave SW Ste 5	Minot	$132,000
ND SUPREME COURT	McIntosh Co Office Property	112 NE 1st	Ashley	$13,428
LANGDON RESEARCH CENTER	2778 Bu Hopper Bin with Auger - 13	9280 107th Ave NE	Langdon	$19,752
ND STATE RADIO COMMUNICATIONS	Wahpeton Radio Equipment	7930 180th Ave SE	Wahpeton	$215,009

Description	Building Name	Address	City	Insured Amount
BISMARCK COMMUNITY BOWL	Parking Lot Fence & Gate	1701 Canary Ave	Bismarck	$22,419
BISMARCK STATE COLLEGE	9-Large Building Signs	Throughout Campus	Bismarck	$74,352
CARRINGTON RESEARCH CENTER	Grain Dryer Unit	663 Hwy 281 NE	Carrington	$2,099
NORTH CENTRAL RESEARCH CENTER	5-Grain Bins	5400 Hwy 83	Minot	$73,930
DOT HIGHWAY DEPARTMENT	Kiosk @ Cash Wise	802 N Elm St	Tioga	$132,000
ND WATER COMMISSION	Dickinson HS Pump Station Antenna	NW4 Sec 9-139-96	Dickinson	$23,107
LANGDON RESEARCH CENTER	2778 Bu Hopper Bin with Auger - 14	9280 107th Ave NE	Langdon	$19,752
ND STATE FAIR	Main Entrance Arch/Security Camera	2005 Burdick Expressway E	Minot	$112,981
ND STATE RADIO COMMUNICATIONS	Cayuga Radio Equipment	10188 138th Ave SE	Havana	$186,342
BISMARCK STATE COLLEGE	15-Small Building Signs	Throughout Campus	Bismarck	$15,931
VALLEY CITY STATE UNIVERSITY	Moving Message Reader	730 8th Ave SW	Valley City	$82,637
CARRINGTON RESEARCH CENTER	4-1900 Bushel Hopper Bins	663 Hwy 281 NE	Carrington	$5,036
DOT HIGHWAY DEPARTMENT	Kiosk @ Frontier Travel Center	705 Highway 12 W	Bowman	$132,000
LANGDON RESEARCH CENTER	2139 Bu Hopper Bin with Auger - 15	9280 107th Ave NE	Langdon	$13,715
ND STATE RADIO COMMUNICATIONS	Valley City Radio Equipment	3475 122nd Ave SE	Valley City	$186,342
BISMARCK STATE COLLEGE	Office Rental @ Sanford Health	222 N 7th	Bismarck	$22,294
CARRINGTON RESEARCH CENTER	1-650 Bushel Hopper Bin	663 Hwy 281 NE	Carrington	$554
DOT HIGHWAY DEPARTMENT	Kiosk @ Hinrichs Supervalu	210 8th St E	Harvey	$132,000
ND SUPREME COURT	Foster Co Office Property	1000 5th St N	Carrington	$25,100
DOT MTCE & ENG SERVICES/RADIO	1000 Gallon Propane Tank	400 Lincoln Ave	Finley	$4,512
DOT MTCE & ENG SERVICES/FARGO	Contents at Fargo Driver's License Office	4101 13th Ave W Ste 37	Fargo	$100,578
ND WATER COMMISSION	Dodge Pump Station Antenna	NW4 Sec 16-144-91	Dodge	$12,404
LANGDON RESEARCH CENTER	2300 Bu Hopper Bin with Auger - 16	9280 107th Ave NE	Langdon	$18,127
ND STATE RADIO COMMUNICATIONS	Merricourt Radio Equipment	7300 83rd St SE	Merricourt	$215,009
CARRINGTON RESEARCH CENTER	4-1900 Bushel Hopper Bins	663 Hwy 281 NE	Carrington	$5,036

Description	Building Name	Address	City	Insured Amount
ND HISTORICAL SOCIETY	Heritage Center Furniture/Equipment	612 East Blvd Ave	Bismarck	$103,753
DOT HIGHWAY DEPARTMENT	Kiosk @ Bottineau Treasurer	314 5th St W Ste 11	Bottineau	$132,000
ND SUPREME COURT	Dickey Co Office Property	309 N 2nd St	Ellendale	$16,111
ND WATER COMMISSION	Richardton Pump Station Antenna	SW4 SW4 Sec 29-140-92	Richardton	$14,509
LANGDON RESEARCH CENTER	2300 Bu Hopper Bin with Auger -17	9280 107th Ave NE	Langdon	$16,827
ND STATE RADIO COMMUNICATIONS	Cleveland Radio Equipment	3229 64 R Ave SE	Cleveland	$186,342
MINOT STATE UNIVERSITY	16-75' Poles with Lights	500 University Ave W	Minot	$70,699
CARRINGTON RESEARCH CENTER	3-5000 Bushel Hopper Bins	6689 6th St NE	Carrington	$47,711
DOT HIGHWAY DEPARTMENT	Kiosk @ Leevers Foods	202 Main Ave E	Rolla	$132,000
ND SUPREME COURT	Wells Co Office Property	700 Railway St N	Fessenden	$15,637
DOT MTCE & ENG SERVICES/RADIO	1000 Gallon Propane Tank	9671 140th Ave NW	Fortuna	$4,512
WILLISTON STATE COLLEGE	Dog Park Fence	1410 University Ave	Williston	$20,000
ND WATER COMMISSION	Beulah Intake Pump Station Antenna	SE4 Sec 14-146-88	Beulah	$8,247
LANGDON RESEARCH CENTER	1000 Bu Hopper Bin with Auger - 18	9280 107th Ave NE	Langdon	$4,500
MAYVILLE STATE UNIVERSITY	Scoreboard	Stan Dakken Dr	Mayville	$29,279
ND STATE FAIR	Message Center Sign/Modem	North Broadway	Minot	$91,106
ND STATE RADIO COMMUNICATIONS	Carrington Radio Equipment	450 58th Ave SE	Carrington	$215,009
BISMARCK STATE COLLEGE	415'x10' Fence	Tennis Court BSC Campus	Bismarck	$15,216
VALLEY CITY STATE UNIVERSITY	Property @ City of Kathryn	515 3rd Ave	Kathryn	$78,565
MINOT STATE UNIVERSITY	44-30' Poles with Lights	500 University Ave W	Minot	$65,553
CARRINGTON RESEARCH CENTER	4-4,120 Bushel Hopper Bins	663 Hwy 281 NE	Carrington	$68,365
ND DEPT OF HUMAN SERVICES	BLHSC @ Dickinson - VR	1674 15th St W Unit E	Dickinson	$143,118
DOT HIGHWAY DEPARTMENT	Kiosk @ Home of Economy	2102 2nd Ave W	Williston	$132,000
ND SUPREME COURT	Sargent Co Office Property	355 Main St S	Forman	$16,929
WILLISTON STATE COLLEGE	Oil Pump with Fence	1410 University Ave	Williston	$50,000
ND WATER COMMISSION	Red River Valley Office	1120 28th Ave N, Ste C	Fargo	$2,777

Description	Building Name	Address	City	Insured Amount
LANGDON RESEARCH CENTER	1000 Bu Hopper Bin with Auger - 19	9280 107th Ave NE	Langdon	$4,500
MAYVILLE STATE UNIVERSITY	Artificial Turf	Stan Dakken Dr	Mayville	$164,748
ND STATE RADIO COMMUNICATIONS	Wishek Radio Equipment	8045 Hwy 3 SE	Wishek	$215,009
VALLEY CITY STATE UNIVERSITY	IAAC Room 150A	1320 Albrecht Blvd	Fargo	$175,373
MINOT STATE UNIVERSITY	Metal Bleacher	500 University Ave W	Minot	$6,015
CARRINGTON RESEARCH CENTER	2-1,096 Bushel Hopper Bins	663 Hwy 281 NE	Carrington	$5,265
ND DEPT OF HUMAN SERVICES	BLHSC @ Dickinson - RCC	1468 21st St W	Dickinson	$60,781
DOT HIGHWAY DEPARTMENT	Kiosk @ Gooseneck Implement	810 Highway 5 E	Mohall	$132,000
ND SUPREME COURT	LaMoure Co Office Property	202 4th Ave NE	LaMoure	$52,352
DOT MTCE & ENG SERVICES/RADIO	1000 Gallon Propane Tank	8500 55th St N	Grand Forks	$4,512
WILLISTON STATE COLLEGE	Tennis Court Fence	1410 University Ave	Williston	$25,000
DICKINSON STATE UNIVERSITY	Daktronics Scoreboard	398 State Ave	Dickinson	$406,593
LANGDON RESEARCH CENTER	1000 BU Hopper Bin with Auger - 20	9280 107th Ave NE	Langdon	$4,500
ND STATE RADIO COMMUNICATIONS	Denhoff Radio Equipment	1381 Hwy 14 NE	Denhoff	$215,009
BISMARCK STATE COLLEGE	1001'x7' Fence	North Side of Tech Center	Bismarck	$26,216
VALLEY CITY STATE UNIVERSITY	Football Scoreboard	730 8th Ave SW	Valley City	$126,121
DOT HIGHWAY DEPARTMENT	Kiosk @ Devils Lake Chamber Office	208 W Highway 2	Devils Lake	$132,000
ND SUPREME COURT	Ransom Co Office Property	205 5th Ave W	Lisbon	$16,062
WILLISTON STATE COLLEGE	5 Monuments	1410 University Ave	Williston	$542,000
DICKINSON STATE UNIVERSITY	1450'x6' Fence/Gates/Turnstile	398 State Ave	Dickinson	$54,031
LANGDON RESEARCH CENTER	1000 BU Hopper Bin with Auger - 21	9280 107th Ave NE	Langdon	$4,500
ND STATE RADIO COMMUNICATIONS	Driscoll Radio Equipment	1855 29 St SE	Driscoll	$186,342
MINOT STATE UNIVERSITY	MSU Monument Sign	500 University Ave W	Minot	$227,019
CARRINGTON RESEARCH CENTER	3-4000 Bushel Hopper Bins	663 Hwy 281 NE	Carrington	$68,220
DOT HIGHWAY DEPARTMENT	Kiosk @ Oien Grocery	118 2nd St E	Mott	$132,000
ND SUPREME COURT	Eddy Co Office Property	524 Central Ave	New Rockford	$58,048

Description	Building Name	Address	City	Insured Amount
DOT MTCE & ENG SERVICES/RADIO	1000 Gallon Propane Tank	10951 6th St SE	Hannaford	$4,512
ND DEPT OF INFORMATION TECHNOLOGY	ITD Equipment	600 E Blvd Ave	Bismarck	$9,680,771
ATTORNEY GENERAL, OFFICE OF THE	BCI Office	314 5th St W Suite 13	Bottineau	$11,440
DICKINSON STATE UNIVERSITY	4-Sport Lights/Poles	398 State Ave	Dickinson	$234,259
LANGDON RESEARCH CENTER	550-Gal Skid Tank	9280 107th Ave NE	Langdon	$1,567
ND STATE FAIR	2906' of Wood Fence	2005 Burdick Expressway E	Minot	$57,366
MINOT STATE UNIVERSITY	1103 LF of Decorative Fencing	500 University Ave W	Minot	$53,093
DOT HIGHWAY DEPARTMENT	Kiosk @ Beulah Chamber Office	300 Hwy 49 S	Beulah	$132,000
ND SUPREME COURT	Hettinger Co Office Property	336 Pacific Ave	Mott	$22,208
ND FOREST SERVICE	Office Property @ NDSU	202A Hultz Hall	Fargo	$35,700
ND WATER COMMISSION	Halliday Booster Antenna	NE4 Sec 4-142-92	Halliday	$12,045
NORTH DAKOTA STATE UNIVERSITY	Scoreboard/Clock	N University Dr & 17th Ave N	Fargo	$31,476
DICKINSON STATE UNIVERSITY	White Vinyl Fence	291 Campus Drive	Dickinson	$105,000
LANGDON RESEARCH CENTER	550-Gal Skid Tank	9280 107th Ave NE	Langdon	$1,567
ND DEPT OF CORRECTIONS & REHABILITATION	Property Inside Range Trailer	7 Miles East of Penitentiary	Bismarck	$503
ND STATE FAIR	282' of Sound Barrier Fence*	2005 Burdick Expressway E	Minot	$17,129
ND STATE RADIO COMMUNICATIONS	Linton Radio Equipment	7515 Hwy 83	Linton	$215,009
ND DEPT OF HUMAN SERVICES	NWHSC @ Watford City	118 4th Ave NE	Watford City	$9,444
DOT HIGHWAY DEPARTMENT	Kiosk @ Town & Country Co-Op	102 9th St SW	Cooperstown	$132,000
ND SUPREME COURT	Golden Valley Co Office Property	150 1st Ave	Beach	$16,764
DOT MTCE & ENG SERVICES/RADIO	1000 Gallon Propane Tank	1575 Hwy 31	Hannover	$4,512
ATTORNEY GENERAL, OFFICE OF THE	Hillsboro Office	114 W Caledonia Ave	Hillsboro	$13,416
ND WATER COMMISSION	New Hradec Booster Antenna	NWSW 4 Sec 13-141-96	New Hradec	$12,045
ND HIGHWAY PATROL	417' of Fence/30' Locking Gate	2300 66th St NE	Bismarck	$16,475
NORTH DAKOTA STATE UNIVERSITY	4-Poles with 18 Lights Per Pole	N University Dr & 17th Ave N	Fargo	$249,844

Description	Building Name	Address	City	Insured Amount
LANGDON RESEARCH CENTER	3016 BU Hopper Bin - 22	9280 107th Ave NE	Langdon	$19,575
ND STATE FAIR	114' of Wrought Iron Fence*	2005 Burdick Expressway E	Minot	$4,163
ND STATE RADIO COMMUNICATIONS	Hannaford Radio Equipment	SW4 SE4 Sec 32-145-59	Hannaford	$62,456
BISMARCK STATE COLLEGE	Mechanical Maintenance Classroom	1831 Twin City Drive	Mandan	$492,108
DOT HIGHWAY DEPARTMENT	Kiosk @ Family Fare Market	3175 25th St S	Fargo	$132,000
ND SUPREME COURT	Burke Co Office Property	103 Main St SE	Bowbells	$19,889
ND FOREST SERVICE	Office Sign	Hwy 32 South	Lisbon	$1,189
ATTORNEY GENERAL, OFFICE OF THE	Lottery Test Office Property	227 W Broadway Ave	Bismarck	$9,464
ND WATER COMMISSION	Jung Lake Pump Station Antenna	SE4 Sec 16-138-97	New England	$12,045
ND STATE FAIR	944' of Tube Rail Fence*	2005 Burdick Expressway E	Minot	$11,464
ND STATE RADIO COMMUNICATIONS	Mayville Radio Equipment	SW 1/2 Sec 5-146-52	Mayville	$62,456
CARRINGTON RESEARCH CENTER	2-4120 Bushel Hopper Bins	663 Hwy 281 NE	Carrington	$33,492
DOT HIGHWAY DEPARTMENT	Kiosk @ Fort Totten Center	7386 Hwy 57	Fort Totten	$132,000
ND SUPREME COURT	Oliver Co Office Property	115 Main St	Center	$3,778
DOT MTCE & ENG SERVICES/RADIO	1000 Gallon Propane Tank	SE 4 Sec 34-147-96	Killdeer	$4,512
ATTORNEY GENERAL, OFFICE OF THE	NDSU Offices - 04 & 06	Office of Attorney General-NDSU	Fargo	$22,880
ND WATER COMMISSION	Bucyrus Booster Antenna	SE4 Sec 36-132-98	Bucyrus	$12,045
ND STATE FAIR	13,558' of Perimeter Fencing	2005 Burdick Expressway E	Minot	$230,573
ND STATE RADIO COMMUNICATIONS	Peer Creek Radio Equipment	ND 16 10 Miles S of Jct ND 68	Beach	$62,456
ND GAME AND FISH	Storage Rental	403 Dakota Ave	Riverdale	$68,761
BISMARCK STATE COLLEGE	NECE Property	1200 Schafer St	Bismarck	$5,872,340
ND HISTORICAL SOCIETY	Carpenter Equip @ Heritage Center	612 East Blvd Ave	Bismarck	$8,602
DOT HIGHWAY DEPARTMENT	Kiosk @ Home of Economy	868 W 12th St	Grafton	$132,000
ND SUPREME COURT	McLean Co Office Property	712 5th Ave	Washburn	$41,931
ND FOREST SERVICE	Fire Hall Items	916 1/2 E Interstate Ave	Bismarck	$488,034
ATTORNEY GENERAL, OFFICE OF THE	UND Offices	UND Twamley Hall, Room 116	Grand Forks	$66,560
ND WATER COMMISSION	Burt Booster Antenna	SE4 Sec 31-134-92	Mott	$12,045

Description	Building Name	Address	City	Insured Amount
ND STATE FAIR	956' of Fencing @ Commercial Bldg I	2005 Burdick Expressway E	Minot	$6,971
ND STATE RADIO COMMUNICATIONS	Wales Radio Equipment	9203 County Road 17	Wales	$125,602
BANK OF NORTH DAKOTA	Office Property - Minot	1020 20th Ave SW	Minot	$10,160
DOT HIGHWAY DEPARTMENT	Kiosk @ Casey's	520 W Caledonia Ave	Hillsboro	$132,000
ND SUPREME COURT	Mercer Co Office Property	1021 Arthur St	Stanton	$33,782
DOT MTCE & ENG SERVICES/RADIO	1000 Gallon Propane Tank	7515 Hwy 83	Linton	$4,512
ND WATER COMMISSION	Coffin Buttes Booster Antenna	E 1/2 Sec 5-132-90	New Leipzig	$12,045
ND STATE RADIO COMMUNICATIONS	Westfield Radio Equipment	9650 7th Ave SE	Westfield	$75,780
BISMARCK STATE COLLEGE	Mandan Lineworker Storage	3201 Nygren	Mandan	$315,207
DOT HIGHWAY DEPARTMENT	Kiosk @ LaMoure Foods	10220 ND-13	LaMoure	$132,000
ND SUPREME COURT	Dunn Co Office Property	205 Owens St	Manning	$16,769
ATTORNEY GENERAL, OFFICE OF THE	BCI Office - Suite 523 & 524	1201 12th St SE	Watford City	$22,880
ND WATER COMMISSION	Scranton Booster Antenna	NW4 Sec 23-132-99	Scranton	$12,045
ND STATE FAIR	33.3' of Fencing at Beer Garden	2005 Burdick Expressway E	Minot	$570
ND STATE RADIO COMMUNICATIONS	Esmond Radio Equipment	4190 Hwy 3 S	Esmond	$74,940
BISMARCK STATE COLLEGE	Meadowlark Bldg Office Property	1701 Schafer St	Bismarck	$759,199
BANK OF NORTH DAKOTA	Office Property - Fargo	1854 NDSU Research Circle N	Fargo	$88,000
DOT HIGHWAY DEPARTMENT	Kiosk @ Treasurer Office	901 3rd St Ste 14	Langdon	$132,000
ND SUPREME COURT	Billings Co Office Property	495 4th St	Medora	$6,423
ND WATER COMMISSION	Rhame Booster Antenna	SE4 Sec 27-132-103	Rhame	$12,045
ND STATE FAIR	120' of Fencing at Beer Garden	2005 Burdick Expressway E	Minot	$4,328
ND STATE RADIO COMMUNICATIONS	Hillsboro Radio Property	590 6th St NW	Hillsboro	$59,313
BISMARCK STATE COLLEGE	Career Academy Property	1200 College Dr	Bismarck	$2,010,662
DOT HIGHWAY DEPARTMENT	Kiosk @ Linton Food Center	206 Highway 83 N	Linton	$132,000
ND SUPREME COURT	Slope Co Office Property	206 S Main St	Amidon	$23,221
ND WATER COMMISSION	Beach Booster PS Antenna	SW4 Sec 24-140-104	Beach	$12,045
ND STATE RADIO COMMUNICATIONS	Mohall Radio Property	4549 Hwy 5	Mohall	$76,005

Description	Building Name	Address	City	Insured Amount
DOT HIGHWAY DEPARTMENT	Kiosk @ Dan's Supermarket	500 Burlington St SE	Mandan	$132,000
ND SUPREME COURT	Griggs Co Office Property	805 Odegard Ave SE	Cooperstown	$20,985
DOT MTCE & ENG SERVICES/RADIO	1000 Gallon Propane Tank	7300 83rd St SE	Merricourt	$4,512
ND DEPT OF INFORMATION TECHNOLOGY	ITD Equipment	035 Fraine Barracks Lane/Radio	Bismarck	$589,542
ND FOREST SERVICE	Office Property @ NDSU	202B Hultz Hall	Fargo	$5,900
ATTORNEY GENERAL, OFFICE OF THE	Minot Office Property	100 1st St SW, Room 202	Minot	$11,500
ND WATER COMMISSION	Zap Reservoir #1/C V Telemetry	NE4 NE4 Sec 7-145-88	Zap	$26,269
ND STATE HOSPITAL	250,000 Gallon Water Tower	2322 Circle Dr	Jamestown	$716,872
ND STATE FAIR	750' of Visibility Barrier Fence	2005 Burdick Expressway E	Minot	$27,050
ND STATE RADIO COMMUNICATIONS	Marmarth Radio Equipment	8809 172 Ave SW	Marmarth	$76,856
DOT HIGHWAY DEPARTMENT	Kiosk @ Travel Plaza	620 Mitchell Ave N	Steele	$132,000
ND SUPREME COURT	Nelson Co Office Property	210 West B Ave, Suite 203	Lakota	$16,896
ATTORNEY GENERAL, OFFICE OF THE	Grand Forks Fire Dept office space	1124 De Mers Ave	Grand Forks	$16,400
ND WATER COMMISSION	Dickinson Reservoir C V Telemetry	NE4 Sec 4-139-95	Dickinson	$26,568
ND DEPT OF CORRECTIONS & REHABILITATION	Submersible Lift	1800 48th Ave SW	Bismarck	$41,478
ND STATE FAIR	3100' of Fencing at Racetrack Area	2005 Burdick Expressway E	Minot	$52,956
BISMARCK STATE COLLEGE	BSC Brick Sign	1700 Schafer St	Bismarck	$29,743
ND HISTORICAL SOCIETY	3-Flagpoles @ Interpretive Center	15349 39th Lane NW	Williston	$9,988
DOT HIGHWAY DEPARTMENT	Kiosk @ City Hall	208 S Main St	Stanley	$132,000
ND SUPREME COURT	Traill Co Office Property	114 W Caledonia	Hillsboro	$17,016
DOT MTCE & ENG SERVICES/RADIO	1000 Gallon Propane Tank	12322 Hwy 66	Milton	$4,512
ND WATER COMMISSION	New England Tank #1 C V Telemetry	SE4 Sec 11-136-97	New England	$40,161
ND HIGHWAY PATROL	Flag Poles and Light Poles	1320 Schaefer Street	Bismarck	$47,975
ND DEPT OF CORRECTIONS & REHABILITATION	Communication Tower	3100 Railroad Ave	Bismarck	$14,435
BISMARCK STATE COLLEGE	Property at Leased Housing Unit	1248 Edwards Ave	Bismarck	$89,967

Description	Building Name	Address	City	Insured Amount
ND HISTORICAL SOCIETY	Exterior Sign @ Interpretive Center	15349 39th Lane NW	Williston	$7,963
DAKOTA COLLEGE AT BOTTINEAU	31'x48' Greenhouse #2	105 Simrall Blvd	Bottineau	$10,208
DOT HIGHWAY DEPARTMENT	Kiosk @ Kirkwood Mall	706 Kirkwood Mall	Bismarck	$132,000
ND SUPREME COURT	Steele Co Office Property	201 Washington Ave W	Finley	$15,534
ND FOREST SERVICE	Permanent Irrigation Boom	878 Nursery Road	Towner	$6,103
ATTORNEY GENERAL, OFFICE OF THE	BCI Washburn	709 6th Ave	Washburn	$11,500
ND WATER COMMISSION	Davis Buttes C V Telemetry	NE4 Sec 25-140-97	Zap	$87,004
ND HIGHWAY PATROL	Contents & Scale @ Minot DOT Maintenance Shop	1305 Hwy 2 Bypass E	Minot	$82,411
ND DEPT OF CORRECTIONS & REHABILITATION	3-Lights*	3100 Railroad Ave	Bismarck	$139,358
ND STATE FAIR	4-Gate Entries*	2005 Burdick Expressway E	Minot	$174,619
BISMARCK STATE COLLEGE	Property at Leased Housing Unit	1226 Edwards Ave	Bismarck	$108,267
DAKOTA COLLEGE AT BOTTINEAU	20'x24' Greenhouse #3	105 Simrall Blvd	Bottineau	$4,774
DOT HIGHWAY DEPARTMENT	Kiosk @ StaMart	3936 East Divide Ave	Bismarck	$132,000
ND SUPREME COURT	Renville Co Office Property	205 Main St East	Mohall	$20,201
DOT MTCE & ENG SERVICES/RADIO	1000 Gallon Propane Tank	1521 54th Ave SW	Minot	$4,512
ND WATER COMMISSION	Halliday Reservoir C V Telemetry	NE4 Sec 22-144-92	Halliday	$36,078
ND HIGHWAY PATROL	Contents & Scale @ Grand Forks DOT Weigh Station	1951 N Washington Street	Grand Forks	$53,000
ND DEPT OF CORRECTIONS & REHABILITATION	3-60' Poles/Lights*	3100 Railroad Ave	Bismarck	$89,591
ND STATE COLLEGE OF SCIENCE	NDSCS Fargo	1305 19th Ave N	Fargo	$1,518,440
DAKOTA COLLEGE AT BOTTINEAU	30'x48' Greenhouse #4	105 Simrall Blvd	Bottineau	$11,524
ND SUPREME COURT	Towner Co Office Property	315 2nd St	Cando	$14,458
ATTORNEY GENERAL, OFFICE OF THE	Medicaid Fraud Investigation Unit	101 Slate Dr Ste 5	Bismarck	$68,700
ND WATER COMMISSION	Bucyrus Reservoir C V Telemetry	NE4 Sec 29-130-97	Bucyrus	$30,276
ND HEALTH DEPARTMENT	Storage @ Denny's Storage	3138 N 10th St	Bismarck	$17,215
ND HIGHWAY PATROL	Contents & Scale @ Devils Lake Weigh Station	316 6th St SE	Devils Lake	$53,500

Description	Building Name	Address	City	Insured Amount
BISMARCK STATE COLLEGE	8-Single Light Poles	1400 Schafer St	Bismarck	$31,117
ND STATE COLLEGE OF SCIENCE	75 KW Generator	Nordgard/Roberson/Bisek/BCT	Wahpeton	$65,076
ND HISTORICAL SOCIETY	Property @ Heritage Center Store	612 East Blvd Ave	Bismarck	$319,000
DAKOTA COLLEGE AT BOTTINEAU	30'x48' Greenhouse #5	105 Simrall Blvd	Bottineau	$9,401
ND SUPREME COURT	Benson Co Office Property	311 B Ave S	Minnewaukan	$16,551
DOT MTCE & ENG SERVICES/RADIO	1000 Gallon Propane Tank	NE 4 NE 4 Sec 21-132-95	Mott	$4,512
ATTORNEY GENERAL, OFFICE OF THE	Burlington Drive Office	1720 Burlington Drive	Bismarck	$1,744,400
ND WATER COMMISSION	Hebron Reservoir C V Telemetry	Lot 4 SW4 Sec 7-139-91	Hebron	$25,893
ND HIGHWAY PATROL	Contents @ Valley City DOT Shed	1524 8th Avenue SW	Valley City	$9,500
BISMARCK STATE COLLEGE	3-Benches & 1-Bike Rack	1400 Schafer St	Bismarck	$16,331
NDSU AG EXPERIMENT RESEARCH	2-8000 bu Bins with Dryers	15th Ave North	Fargo	$67,984
ND STATE COLLEGE OF SCIENCE	40 KW Generator	Barnard/MJ Library/Ag Mech Tech	Wahpeton	$47,724
DAKOTA COLLEGE AT BOTTINEAU	30'x48' Greenhouse #6	105 Simrall Blvd	Bottineau	$9,588
ND SUPREME COURT	JBIT Main Office	116 4th St	Bismarck	$2,039,906
ND FOREST SERVICE	NDSU Office property Contents	209 C Morrill Hall	Fargo	$7,404
ND WATER COMMISSION	Richardton Reservoir C V Telemetry	SE4 Sec 31-140-92	Richardton	$32,128
ND STATE FAIR	115-Street Lights at Fairgrounds	2005 Burdick Expressway E	Minot	$843,312
BISMARCK STATE COLLEGE	Dumpster Enclosure	1400 Schafer St	Bismarck	$45,681
ND STATE COLLEGE OF SCIENCE	50 KW Generator	Schuett/Trade Tech/Allied Health	Wahpeton	$53,509
DAKOTA COLLEGE AT BOTTINEAU	30'x48' Greenhouse #7	105 Simrall Blvd	Bottineau	$10,583
ND SUPREME COURT	Education 1st Floor	1st Floor State Capitol	Bismarck	$162,189
DOT MTCE & ENG SERVICES/RADIO	1000 Gallon Propane Tank	4681 87th St NE	Mylo	$4,512
ND FOREST SERVICE	Bowman Apartment Contents	14 3rd Ave SE	Bowman	$43,461
ATTORNEY GENERAL, OFFICE OF THE	SSCDI	4501 N Coleman St. Suite 106	Bismarck	$29,000
ND WATER COMMISSION	Burt Reservoir C V Telemetry	NE4 NE4 Sec 23-134-92	Burt	$25,893

Description	Building Name	Address	City	Insured Amount
ND STATE FAIR	250'x4' Cedar Vinyl Fence w/12' Gate	2005 Burdick Expressway E	Minot	$17,003
BISMARCK STATE COLLEGE	Kiln Shelter	1400 Schafer St	Bismarck	$45,775
ND STATE COLLEGE OF SCIENCE	Blikre Activity Center Sign	14th Ave North	Wahpeton	$45,912
DAKOTA COLLEGE AT BOTTINEAU	31'x96' Greenhouse #8	105 Simrall Blvd	Bottineau	$15,422
ND SUPREME COURT	JBIT Server Room	Ground Floor State Capitol	Bismarck	$1,199,745
ND WATER COMMISSION	Bowman Reservoir C V Telemetry	NE4 Sec 2-131-102	Bowman	$24,492
ND HEALTH DEPARTMENT	Anti-Viral Storage/Security System	1509 Grumman Lane, Suite A	Bismarck	$1,742,120
ND STATE FAIR	4-Light poles with security cameras	2005 Burdick Expressway E	Minot	$37,929
BISMARCK STATE COLLEGE	Nacelle Trainer	1200 Schafer St	Bismarck	$151,554
ND STATE COLLEGE OF SCIENCE	Student Activity Center Sign	6th St North	Wahpeton	$47,504
ND SUPREME COURT	Grant Co Office Property	106 2nd Ave NE	Carson	$3,992
DOT MTCE & ENG SERVICES/RADIO	1000 Gallon Propane Tank	4325 45th Ave	New Salem	$4,512
ND WATER COMMISSION	Fryburg Reservoir C V Telemetry	NE4 Sec 17-139-100	Belfield	$20,303
ND STATE FAIR	2500' x 6' Security Fence	2005 Burdick Expressway E	Minot	$40,815
ND SUPREME COURT	JBIT DR Site	3901 Great Plains Dr	Fargo	$754,722
ND WATER COMMISSION	Beach Reservoir C V Telemetry	NE4 Sec 27-140-105	Beach	$20,303
ND SUPREME COURT	Sioux Co Office Property	302 2nd Ave	Fort Yates	$3,705
DOT MTCE & ENG SERVICES/RADIO	1000 Gallon Propane Tank	4014 123rd Ave NE	Petersburg	$4,512
ND WATER COMMISSION	Gladstone PRV Telemetry	SW4 Sec 33-140-94	Gladstone	$5,711
ND STATE FAIR	LED Message Center	2005 Burdick Expressway E	Minot	$92,329
ND SUPREME COURT	Emmons Co Office Property	100 4th St NW	Linton	$3,831
ND WATER COMMISSION	Regent PRV Telemetry	NW4 Sec 21-134-95	Regent	$5,711
ND STATE FAIR	2000' x 6'/4- walk gates	2005 Burdick Expressway E	Minot	$29,760
ND SUPREME COURT	Sheridan Co Office Property	215 E 2nd St	McClusky	$18,417
DOT MTCE & ENG SERVICES/RADIO	1000 Gallon Propane Tank	4195 76th St	Raleigh	$4,512
ND WATER COMMISSION	Bucyrus PRV Telemetry	NW4 Sec 26-130-97	Bucyrus	$5,711
ND SUPREME COURT	Logan Co Office Property	301 Broadway	Napoleon	$20,671

Description	Building Name	Address	City	Insured Amount
ND WATER COMMISSION	Hettinger M M Vault Telemetry	SW4 Sec 35-129-96	Hettinger	$26,275
BISMARCK STATE COLLEGE	Green Sign	1831 Twin City Dr SE	Mandan	$4,300
JOB SERVICE NORTH DAKOTA	Stand Alone Emergency Generator	1000 Divide Ave	Bismarck	$494,324
ND HISTORICAL SOCIETY	2-Parking Lot Poles with Lights	935 Broadway	Abercrombie	$5,701
ND SUPREME COURT	Kidder Co Office Property	120 E Broadway	Steele	$11,677
DOT MTCE & ENG SERVICES/RADIO	1000 Gallon Propane Tank	28301 184th St SW	Ryder	$4,512
ND WATER COMMISSION	Hebron Reservoir C V Antenna	SE4 Sec 31-140-92	Hebron	$12,045
ND DEPT OF CORRECTIONS & REHABILITATION	Perimeter Fence Security System	1624 23rd St SE	Jamestown	$454,583
BISMARCK STATE COLLEGE	Two Parking Lot Lights	1831 Twin City Dr SE	Mandan	$9,000
ND HISTORICAL SOCIETY	2-Flagpoles with 2-Light Fixtures	935 Broadway	Abercrombie	$10,816
ND WATER COMMISSION	Hebron Reservoir/Antenna	Lot 4 SW4 Sec 7-139-97	Hebron	$435,398
ND DEPT OF CORRECTIONS & REHABILITATION	160x20' & 800x30' Fence/Razor Wire	1624 23rd St SE	Jamestown	$25,551
ND DEPT OF HUMAN SERVICES	SCHSC @ Jamestown TL Home	606 14th St NE	Jamestown	$77,300
DOT MTCE & ENG SERVICES/RADIO	1000 Gallon Propane Tank	150 1st Ave SE	Sentinel Butte	$4,512
ND WATER COMMISSION	Burt Reservoir/Antenna	NE4 NE4 Sec 23-134-92	Mott	$452,004
ND DEPT OF CORRECTIONS & REHABILITATION	2000x16' Fencing	1624 23rd St SE	Jamestown	$116,137
ND WATER COMMISSION	Bowman Reservoir	NE4 Sec 2-131-102	Bowman	$416,439
ND DEPT OF CORRECTIONS & REHABILITATION	1750x12' & 8250x30' Fence/Razor Wire	1624 23rd St SE	Jamestown	$181,255
DOT MTCE & ENG SERVICES/RADIO	1000 Gallon Propane Tank	6143 103rd Ave NW	Tioga	$4,512
ND WATER COMMISSION	Fryburg Reservoir/Antenna	NE4 Sec 17-139-100	Belfield	$390,788
ND DEPT OF CORRECTIONS & REHABILITATION	2090x8' Fencing	1624 23rd St SE	Jamestown	$41,608
DICKINSON RESEARCH CENTER	3-4000 Bushel Hopper Bins	11090 15th St SW	Manning	$68,976
ND DEPT OF HUMAN SERVICES	NEHSC Outreach Office @ Cavalier	301 Mountain Street	Cavalier	$7,300

Description	Building Name	Address	City	Insured Amount
ND WATER COMMISSION	Beach Reservoir/Antenna	NE4 Sec 27-140-105	Beach	$389,500
DICKINSON RESEARCH CENTER	2-1250 Bushel Drive Under Bins	11090 15th St SW	Manning	$25,959
DOT MTCE & ENG SERVICES/RADIO	1000 Gallon Propane Tank	3475 122nd Ave SE	Valley City	$4,512
ND WATER COMMISSION	New England Reservoir #2	SE4 Sec 11-136-97	New England	$979,109
DICKINSON RESEARCH CENTER	3-1500 Bushel Hopper Bins	11090 15th St SW	Manning	$50,426
ND WATER COMMISSION	Belfield Reservoir/Antenna	S 1/2 Sec 34-140-99	Belfield	$491,892
ADJUTANT GENERAL, CAMP GRAFTON	7-Mobile Homes	4417 Hwy 20	Devils Lake	$0
DICKINSON RESEARCH CENTER	2-1500 Bushel Drive Under Bins	11090 15th St SW	Manning	$28,050
DOT MTCE & ENG SERVICES/RADIO	1000 Gallon Propane Tank	7930 180th Ave SE	Wahpeton	$4,512
ND WATER COMMISSION	Halliday Booster/Telemetry	NE4 Sec 4-142-92	Halliday	$247,991
ND WATER COMMISSION	Hebron VFD Booster	SE4 Sec 13-139-91	Hebron	$149,264
ND HEALTH DEPARTMENT	Emergency Preparedness & Response	1720 Burlington Dr	Bismarck	$2,515,928
ADJUTANT GENERAL, CAMP GRAFTON	5-Mobile Homes	4417 Hwy 20	Devils Lake	$0
DOT MTCE & ENG SERVICES/RADIO	1000 Gallon Propane Tank	12737 48th St NW	Williston	$4,512
ND WATER COMMISSION	Burt Booster	SE4 Sec 31-134-92	Mott	$339,069
ND HEALTH DEPARTMENT	Improvements & Betterments	1720 Burlington Dr	Bismarck	$462,691
ND WATER COMMISSION	Scranton Booster/Telemetry	NW4 Sec 23-132-99	Scranton	$370,393
ND HEALTH DEPARTMENT	3 Mobile Medical Labs-Connected	2635 East Main Ave	Bismarck	$1,218,656
DOT MTCE & ENG SERVICES/RADIO	1000 Gallon Propane Tank	8045 Hwy 3 SE	Wishek	$4,512
ND WATER COMMISSION	Rhame Booster Station/Telemetry	SE4 Sec 27-132-103	Rhame	$195,360
ND DEPT OF HUMAN SERVICES	LRHSC - CRU @ Rolla	103 1st Ave SE	Rolla	$28,983
ND WATER COMMISSION	W Rainy Butte VFD Booster	SE4 Sec 15-135-98	New England	$133,941
ND HEALTH DEPARTMENT	COVID Testing Machine-Fargo	4035 19th Ave North	Fargo	$64,893
ND WATER COMMISSION	PLC Booster	NW4 Sec 27-134-86	Raleigh	$111,756
NORTH DAKOTA STATE UNIVERSITY	Plant Science Greenhouse	1230 16 1/2 St N	Fargo	$168,354

Description	Building Name	Address	City	Insured Amount
JOB SERVICE NORTH DAKOTA	6-Parking Lot Light Fixtures	1601 E Century Ave	Bismarck	$20,796
ND DEPT OF HUMAN SERVICES	NEHSC - Dornheim Group Home @ Grand Forks	1407 10th Ave S	Grand Forks	$42,836
DOT MTCE & ENG SERVICES/RADIO	1000 Gallon Propane Tank	ND 16 10 Miles S of Jct ND 68	Beach	$4,512
ND WATER COMMISSION	N Mott Booster	NW4 Sec 26-135-92	Mott	$117,284
JOB SERVICE NORTH DAKOTA	1-Flagpole Fixture with Light	1601 East Century Ave	Bismarck	$2,657
ND WATER COMMISSION	Coffin Buttes Booster/Telemetry	E 1/2 Sec 5-132-90	New Leipzig	$185,105
ND DEPT OF CORRECTIONS & REHABILITATION	1100 x12' Security Fence/Razor Wire	1624 23rd St SE	Jamestown	$134,097
JOB SERVICE NORTH DAKOTA	Job Service Podium Sign	1601 East Century Ave	Bismarck	$1,872
DOT MTCE & ENG SERVICES/RADIO	1000 Gallon Propane Tank	1915 Main Ave W	West Fargo	$4,512
ND WATER COMMISSION	Fryburg VFD Booster	NE4 Sec 17-139-100	Fryburg	$482,880
ND WATER COMMISSION	Beach Booster/Telemetry	SW4 Sec 24-140-104	Beach	$464,451
ND DEPT OF CORRECTIONS & REHABILITATION	100' Light Fixture	2521 Circle Drive	Jamestown	$64,466
ND WATER COMMISSION	West Medora VFD/Telemetry	SE4 Sec 19-140-102	Medora	$82,139
ND DEPT OF CORRECTIONS & REHABILITATION	Security Fence/Razor Wire	2521 Circle Drive	Jamestown	$299,120
ND WATER COMMISSION	New Hradec Booster/Telemetry	NWSW4 Sec 13-141-96	New Hradec	$186,628
DOT MTCE & ENG SERVICES/RADIO	1000 Gallon Propane Tank	4190 Hwy 3 South	Esmond	$4,512
ND WATER COMMISSION	S Mott Pneumatic Booster	SE4 Sec 11-133-93	Mott	$161,916
DOT MTCE & ENG SERVICES/RADIO	1000 Gallon Propane Tank	9203 County Road 17	Wales	$4,512
NORTH DAKOTA STATE UNIVERSITY	Northern Crops Science	1307 18th St N	Fargo	$5,453,548
ND DEPT OF CORRECTIONS & REHABILITATION	Devils Lake Juvenile Services	304 4th St NE, Suite 2	Devils Lake	$46,174
DOT MTCE & ENG SERVICES/RADIO	1000 Gallon Propane Tank	8809 172 Ave SW	Marmarth	$4,512
ND WATER COMMISSION	1400'x6' Fencing	2901 E Main	Bismarck	$38,077
ND DEPT OF CORRECTIONS & REHABILITATION	Fargo Juvenile Services	461 34th St S, Suite C	Fargo	$66,277

Description	Building Name	Address	City	Insured Amount
JOB SERVICE NORTH DAKOTA	3-Poles with Lights	1000 Divide Ave	Bismarck	$11,244
ND WATER COMMISSION	935'x6' Fencing/Gates	4665 2nd St SW	Dickinson	$37,376
ND DEPT OF CORRECTIONS & REHABILITATION	Minot Juvenile Services	1425 21st Ave NW, Suite B	Minot	$49,961
ND DEPT OF HUMAN SERVICES	10-SEHSC Light Poles @ Fargo	2624 9th Ave SW	Fargo	$25,758
DOT MTCE & ENG SERVICES/RADIO	1000 Gallon Propane Tank	590 6th St NW	Hillsboro	$4,512
ND WATER COMMISSION	1092'x6' Fencing	143 South States Ave	Dickinson	$36,830
ND DEPT OF CORRECTIONS & REHABILITATION	Dickinson Juvenile Services	135 Sims St, Suite 205	Dickinson	$63,507
ND WATER COMMISSION	Fairfield Reservoir	SE4 SE4 Sec 4-T142N-R99W	Fairfield	$542,798
ND DEPT OF CORRECTIONS & REHABILITATION	Grand Forks Juvenile Services	311 S 4th St, Suite 119	Grand Forks	$72,903
JOB SERVICE NORTH DAKOTA	40' Flagpole with 2-Flags	1530 32nd St S	Fargo	$3,750
DOT MTCE & ENG SERVICES/RADIO	1000 Gallon Propane Tank	4549 Hwy 5	Mohall	$4,512
ND WATER COMMISSION	Dodge Air Chamber #1	NE4 Sec 13-T144N-R91W	Dodge	$37,994
ND DEPT OF CORRECTIONS & REHABILITATION	Bismarck Juvenile Services	921 S 9th St, Suite 110	Bismarck	$82,160
JOB SERVICE NORTH DAKOTA	3-Parking Lot Poles with Lights	1530 32nd St S	Fargo	$19,674
ND DEPT OF HUMAN SERVICES	SEHSC Flagpole	2624 9th Ave SW	Fargo	$2,196
ND WATER COMMISSION	Dodge Air Chamber #2	NE4 NE4 Sec29-T144N-R91W	Dodge	$37,994
NORTH DAKOTA STATE UNIVERSITY	2-Football Towers	N University Dr & 17th Ave N	Fargo	$123,735
ND DEPT OF CORRECTIONS & REHABILITATION	Jamestown Juvenile Services	419 5th St NE, Suite #2	Jamestown	$45,525
JOB SERVICE NORTH DAKOTA	30' Sign	1530 32nd St S	Fargo	$3,563
ND DEPT OF HUMAN SERVICES	Bismarck - Workforce Safety Building	1600 E Century Ave Suite 7	Bismarck	$572,879
DOT MTCE & ENG SERVICES/RADIO	1000 Gallon Propane Tank	9650 7th Ave SE	Westfield	$4,512
ND WATER COMMISSION	Dodge Air Chamber #3	NW4 Sec 3-T141N-R92W	Dodge	$37,994

Description	Building Name	Address	City	Insured Amount
ND DEPT OF CORRECTIONS & REHABILITATION	Williston Juvenile Services	705 East Highland Dr STE A	Williston	$43,737
ND WATER COMMISSION	Golva VFDBP Station	NW4 NW4 Sec 22-T139N-R105W	Golva	$100,694
JOB SERVICE NORTH DAKOTA	Monument Sign/2-Spotlights	1501 28th Ave S	Grand Forks	$7,984
ND WATER COMMISSION	Medora SPRV Station	NE4 NE4 Sec 34-T140N-R102W	Medora	$79,116
JOB SERVICE NORTH DAKOTA	6-Parking Lot Poles with Lights	1501 28th Ave S	Grand Forks	$16,753
ND WATER COMMISSION	Junction Inn Master Meter	NE4 NE4 Sec 27-T136N-R83W	St Anthony	$28,067
ND DEPT OF CORRECTIONS & REHABILITATION	Fargo Field Service Division	461 34th St S	Fargo	$227,069
JOB SERVICE NORTH DAKOTA	Flagpole with 2-Spotlights	1501 28th Ave S	Grand Forks	$5,061
ND WATER COMMISSION	Fairfield Booster Pump Station	NW4 NW4 Sec 35-T142N-R99W	Fairfield	$105,444
ND DEPT OF CORRECTIONS & REHABILITATION	Minot Field Service Division	1600 2nd Ave NW, Suite 12 & 14	Minot	$65,096
JOB SERVICE NORTH DAKOTA	Job Service Sign	301 College Dr S	Devils Lake	$4,620
ND WATER COMMISSION	Tower Hill VFDBP Station	NE4 SW4 Sec 4-T136N-R81W	St Anthony	$54,954
ND DEPT OF CORRECTIONS & REHABILITATION	Devils Lake Field Service Division	225 Walnut St East	Devils Lake	$43,668
JOB SERVICE NORTH DAKOTA	4-8' Poles with Lights	3416 N Broadway	Minot	$22,485
ND WATER COMMISSION	N Crown Butte VFDBP Station	NW4 SW4 Sec 3-T139N-R83W	Mandan	$52,236
ND DEPT OF CORRECTIONS & REHABILITATION	Grand Forks Field Office Division	311 S 4th St, Suite 101, 115, 117	Grand Forks	$131,000
ND GAME AND FISH	Perimeter Fence with Barbed Wire & Gates	100 N Bismarck Expressway	Bismarck	$40,000
ND WATER COMMISSION	S Fryburg VFD Booster Pump Station	SW4 SW4 Sec 4T137NR99W	Fryburg	$66,711
ND PARKS AND RECREATION DEPARTMENT	Kitchen Appliances In Trailer	2090-055 13571 Hwy 5	Cavalier	$433
ND DEPT OF CORRECTIONS & REHABILITATION	Williston Field Service Division	705 E Highland Dr Suite B	Williston	$45,650
ND GAME AND FISH	Brick Sign	100 N Bismarck Expressway	Bismarck	$25,000
JOB SERVICE NORTH DAKOTA	Flagpole & Job Service Sign	3416 N Broadway	Minot	$7,496

Description	Building Name	Address	City	Insured Amount
ND DEPT OF HUMAN SERVICES	Prairie Hills Plaza - Bismarck	1237 West Divide	Bismarck	$2,613,307
ND WATER COMMISSION	W Killdeer VFD Booster Pump Station	NE4 SE4 Sec 1T145NR97W	Killdeer	$33,222
ND DEPT OF CORRECTIONS & REHABILITATION	Dickinson Field Service Division	135 Sims St Suite 206, 207	Dickinson	$54,382
ND GAME AND FISH	Perimeter Fence	403 Dakota Avenue	Bismarck	$30,000
JOB SERVICE NORTH DAKOTA	Flagpole	422 1st Ave W	Williston	$3,750
ND WATER COMMISSION	542,000 Gallon Burlington Reservoir 1	NE4 Sec 14-155-84	Burlington	$599,490
ND DEPT OF CORRECTIONS & REHABILITATION	Wahpeton Field Service Division	709 Dakota Ave Suite D	Wahpeton	$34,936
ND GAME AND FISH	2 Storage Containers	403 Dakota Avenue	Bismarck	$5,000
JOB SERVICE NORTH DAKOTA	Flagpole	66 Osborn Dr	Dickinson	$4,685
ADJUTANT GENERAL, OFFICE OF THE	1000 KW Diesel Generator	050 Fraine Barracks Lane	Bismarck	$448,903
ND WATER COMMISSION	796,000 Gallon Berthold Reservoir 2	NE4 Sec 28-156-86	Berthold	$755,383
ND DEPT OF CORRECTIONS & REHABILITATION	Rolla Field Service Division	1102 Main Avenue West	Rolla	$26,200
ND GAME AND FISH	Perimeter Fence	3001 E Main Street	Bismarck	$45,000
JOB SERVICE NORTH DAKOTA	2-Parking Lot Poles with Lights	66 Osborn Dr	Dickinson	$6,372
ND DEPT OF CORRECTIONS & REHABILITATION	Grafton Field Service Division	638 Cooper Ave	Grafton	$26,200
ND GAME AND FISH	Parking Lot Lights	100 N Bismarck Expressway	Bismarck	$33,000
UNIVERSITY OF NORTH DAKOTA	Laird Core & Sample Library	Campus Road & Cornell	Grand Forks	$115,755
ND DEPT OF CORRECTIONS & REHABILITATION	Mandan Field Service Division	200 W Main Street	Mandan	$66,672
JOB SERVICE NORTH DAKOTA	Leased Office Space	1307 12th Ave NE Suite 3	Jamestown	$109,668
ND WATER COMMISSION	Zap Potable Reservoir	101 County Road 13	Zap	$1,235,705
ND DEPT OF CORRECTIONS & REHABILITATION	Oakes Field Service Division	124 5th Street South	Oakes	$17,467
ND DEPT OF HUMAN SERVICES	Child Support Enforcement - Devils Lake	1820 Walnut St E Suite 4	Devils Lake	$76,332
ND WATER COMMISSION	Josephine 89' Standpipe Tank	6145 60th St	Minnewaukan	$578,213

Description	Building Name	Address	City	Insured Amount
ND DEPT OF CORRECTIONS & REHABILITATION	Jamestown Field Service Division	702 1st Ave S	Jamestown	$54,172
ND DEPT OF HUMAN SERVICES	Child Support Enforcement - Fargo	4950 13th Ave S Suite 22	Fargo	$218,496
ND WATER COMMISSION	Josephine 50 CFS Pump #1	6145 60th St	Minnewaukan	$236,032
ND WATER COMMISSION	Josephine 50 CFS Pump #2	6145 60th St	Minnewaukan	$236,032
ND DEPT OF CORRECTIONS & REHABILITATION	Fargo Re-Entry Center	123 15th St North	Fargo	$8,732
ND WATER COMMISSION	Josephine 75 CFS Pump #3	6145 60th St	Minnewaukan	$516,612
ND DEPT OF CORRECTIONS & REHABILITATION	Bismarck Field Service Division	601 Channel Drive	Bismarck	$165,124
ND DEPT OF HUMAN SERVICES	Child Support Enforcement - Williston	205 E Bdwy Suites 103 & 113	Williston	$45,319
ND WATER COMMISSION	Josephine 75 CFS Pump #4	6145 60th St	Minnewaukan	$516,612
ND DEPT OF CORRECTIONS & REHABILITATION	Washburn Field Service Division	712 5th Ave/2nd Floor	Washburn	$8,732
ND DEPT OF INFORMATION TECHNOLOGY	ITD Equipment	1320 Albrecht Blvd	Fargo	$335,844
ND WATER COMMISSION	Round Lake 50 CFS Pump #1	4226 64th Ave NE	Minnewaukan	$209,217
ND DEPT OF HUMAN SERVICES	BLHSC @ Bowman	408 2nd St SW	Bowman	$6,860
ND WATER COMMISSION	Round Lake 50 CFS Pump #2	4226 64th Ave NE	Minnewaukan	$209,296
ND WATER COMMISSION	Round Lake 75 CFS Pump #3	4226 64th Ave NE	Minnewaukan	$566,123
ND WATER COMMISSION	Round Lake 75 CFS Pump #4	4226 64th Ave NE	Minnewaukan	$566,123
ND WATER COMMISSION	Center Elevated Tank	NW4 Sec 30-142-87	Beulah	$1,884,437
ND WATER COMMISSION	Round Lake Elevated Tank	4226 64th Ave NE	Minnewaukan	$558,439
ND DEPT OF HUMAN SERVICES	SEHSC DD - Fargo	1401 32nd St S	Fargo	$86,227
ND WATER COMMISSION	8-Poles with Lightning Arrestors	4226 64th Ave NE	Minnewaukan	$9,492
ND WATER COMMISSION	2-Poles with Lights	4226 64th Ave NE	Minnewaukan	$7,909
ND DEPT OF HUMAN SERVICES	LRHSC - New Rolla Outreach Office	1102 Main Ave W	Rolla	$127,456

Description	Building Name	Address	City	Insured Amount
NDSU AG EXPERIMENT RESEARCH	Property at Beef Systems Center	1901 Great Northern Dr	Fargo	$71,753
ND WATER COMMISSION	6-Poles with Lightning Arrestors	6145 60th St	Minnewaukan	$7,119
ND WATER COMMISSION	2-Poles with Lights	6145 60th St	Minnewaukan	$7,909
ND DEPT OF HUMAN SERVICES	NCHSC - Open Arms @ Minot	18 3rd St SE Ste 300	Minot	$46,055
ND DEPT OF HUMAN SERVICES	SEHSC Vocational Rehabilitation	1655 43rd St S, Suite 208	Wahpeton	$181,843
ND WATER COMMISSION	Center Booster Station	SW4 Sec 25-T143N-R88W	Center	$490,068
ND DEPT OF HUMAN SERVICES	SCHSC @ Valley City	415 2nd Ave NE, Ste 201	Valley City	$76,225
ND WATER COMMISSION	Hazen PRV Vault Telemetry	SE4 Sec 5-144-86	Hazen	$24,119
ND DEPT OF HUMAN SERVICES	Child Support Enforcement - Grand Forks	3001 A 32nd Ave S Ste 3	Grand Forks	$211,122
ND WATER COMMISSION	Beulah PRV Vault Telemetry	NE4 Sec 18-144-87	Beulah	$22,952
ND WATER COMMISSION	RO Concentrate Discharge CVT	NE4 Sec 14-146-88	Beulah	$55,701
ND DEPT OF HUMAN SERVICES	NEHSC - VR	1501 28th Ave South	Grand Forks	$112,477
ND WATER COMMISSION	MWWS Booster Station	SE4 Sec 4-139N-85W	Center	$260,097
ND DEPT OF HUMAN SERVICES	Bismarck - Job Service Building	1000 E Divide	Bismarck	$445,311
ND WATER COMMISSION	East End Outlet Pump #1	SE4 of NW4 Sec 8, T151N, R62W	Warwick	$439,988
NDSU AG EXPERIMENT RESEARCH	Refrigerator/Freezer Perishable Items	4035 19th Ave N (located in #137)	Fargo	$203,178
ND DEPT OF HUMAN SERVICES	LRHSC - VR	301 College Drive S	Devils Lake	$78,625
ND WATER COMMISSION	East End Outlet Pump #2	SE4 of NW4 Sec 8, T151N, R62W	Warwick	$439,988
ND DEPT OF HUMAN SERVICES	NEHSC Storage Building @ Grand Forks	5118 Gateway Drive	Grand Forks	$42,056
ND WATER COMMISSION	East End Outlet Pump #3	SE4 of NW4 Sec 8, T151N, R62W	Warwick	$439,988
ND DEPT OF HUMAN SERVICES	NEHSC - Emergency Services	201 S. 4th St, 1st Floor	Grand Forks	$20,218
ND WATER COMMISSION	East End Outlet Pump #4	SE4 of NW4 Sec 8, T151N, R62W	Warwick	$439,988
ND WATER COMMISSION	East End Outlet Pump #5	SE4 of NW4 Sec 8, T151N, R62W	Warwick	$439,988
ND WATER COMMISSION	296,000 Gallon Tank @ New Hradec	NE4 Sec 26-141-96	New Hradec	$533,365
ND WATER COMMISSION	Zap Potable Reservoir	101 County Road 13	Zap	$1,222,725

Description	Building Name	Address	City	Insured Amount
ND WATER COMMISSION	Dunn Center Tank/Fence/Telemetry	NE4 Sec 9-T165N-R94W	Dunn Center	$2,844,394
ND DEPT OF CORRECTIONS & REHABILITATION	225x8' Tennis Court Fence	701 16th Ave SW	Mandan	$8,849
ND WATER COMMISSION	Killdeer MT Tank/Fence/Telemetry	NE4 Sec 9-T145N-R96W	Killdeer	$1,466,669
ND DEPT OF CORRECTIONS & REHABILITATION	18-Street Lights*	701 16th Ave SW	Mandan	$37,591
ND DEPT OF CORRECTIONS & REHABILITATION	2-Basketball Goals*	701 16th Ave SW	Mandan	$1,966
ND WATER COMMISSION	2000 kw generator & fuel tank	3490 Hwy 8	Richardton	$751,956
ND DEPT OF CORRECTIONS & REHABILITATION	954x6' Softball Fence with Backstop	701 16th Ave SW	Mandan	$23,415
ND WATER COMMISSION	1500 kw generator & fuel tank	NW4 Sec 16-144-91	Dodge	$836,115
ND WATER COMMISSION	1500 kw generator	6153 3rd St NW	Beulah	$434,635
ND DEPT OF CORRECTIONS & REHABILITATION	12-Fire Hydrants*	701 16th Ave SW	Mandan	$20,562
ND WATER COMMISSION	400 kw generator & transfer switch	6299 Hwy 22 S	New England	$123,761
ND WATER COMMISSION	1000 kw generator	811 W Broadway	Dickinson	$383,076
NORTH DAKOTA STATE UNIVERSITY	2-NDSU Illuminated Signs	12th Ave N/19th Ave N & 18th St N	Fargo	$171,237
ND WATER COMMISSION	WTP Security Fencing	735 W Broadway	Dickinson	$86,688
ND WATER COMMISSION	Richardton Water Tank #2	SW1/4, Section 29-140-92	Richardton	$811,350
ND DEPT OF CORRECTIONS & REHABILITATION	Commodity/Freezer Storage	2517 Circle Dr	Jamestown	$68,428
ND WATER COMMISSION	Dickinson Water Tank #2	NE1/4, Section 4-139-95	Dickinson	$1,013,874
ND DEPT OF CORRECTIONS & REHABILITATION	Commissary @ JRCC	2517 Circle Dr	Jamestown	$376,361
ND WATER COMMISSION	2nd Davis Buttes Reservoir and Mixers	10844 34th St SW	Dickinson	$1,027,579
NORTH DAKOTA STATE UNIVERSITY	Fargo Cass Public Health	301 NP Ave	Fargo	$81,750
ND WATER COMMISSION	Fencing @ 2nd Davis Buttes Reservoir	10844 34th St SW	Dickinson	$12,865
ND WATER COMMISSION	Telemetry Panels	10844 34th St SW	Dickinson	$3,217

Description	Building Name	Address	City	Insured Amount
NORTH DAKOTA STATE UNIVERSITY	Leased Prairie Hall	1616 12th Ave NW	Fargo	$327,845
ND DEPT OF CORRECTIONS & REHABILITATION	Bottineau Field Service Division	104 West 11 Street	Bottineau	$6,267
ND WATER COMMISSION	2nd Belfield Reservoir, Mixers, and Control Panels	12864 Hwy 10	Belfield	$892,012
NORTH DAKOTA STATE UNIVERSITY	1400 kw Generator at Renaissance Hall	650 NP Ave	Fargo	$468,335
ND DEPT OF CORRECTIONS & REHABILITATION	5000 & 500 Gallon Fuel Tank/Bollards	701 16th Ave SW	Mandan	$93,309
ND WATER COMMISSION	Taylor Elevated Tank	464 5th St W	Taylor	$2,288,554
ND DEPT OF CORRECTIONS & REHABILITATION	Beulah Field Service Division	117 Hwy 49 Suite A	Beulah	$8,803
ND PARKS AND RECREATION DEPARTMENT	Bismarck Office Property	7500 604 E Boulevard Ave Dept 750	Bismarck	$107,655
NORTH DAKOTA STATE UNIVERSITY	Library Storage Facility	3551 7th Ave North	Fargo	$35,891,001
NORTH DAKOTA STATE UNIVERSITY	Property at Graduate Center	1201 12th Ave North	Fargo	$52,402
ND DEPT OF CORRECTIONS & REHABILITATION	Finished product stored outside	3100 Railroad Ave	Bismarck	$200,000
NORTH DAKOTA STATE UNIVERSITY	Research & Technology II	1805 Research Park Drive	Fargo	$14,395,201
NORTH DAKOTA STATE UNIVERSITY	Northern Tier Network Property	409 1st Ave N	Fargo	$431,402
NORTH DAKOTA STATE UNIVERSITY	Northern Tier Network Property	Corner of 146th Ave SE	Galesburg	$35,006
NORTH DAKOTA STATE UNIVERSITY	Northern Tier Network Property	S 3rd St SW	Mayville	$35,006
NORTH DAKOTA STATE UNIVERSITY	Northern Tier Network Property	Hwy 32	Oriska	$30,888
ADJUTANT GENERAL, CAMP GRAFTON	Fuel Dispensing System @ #158	4417 Hwy 20	Devils Lake	$506,351
NORTH DAKOTA STATE UNIVERSITY	Northern Tier Network Property	3rd St SE & 12th Ave SE	Jamestown	$30,888
ADJUTANT GENERAL, CAMP GRAFTON	2-12,000 Gallon AST's	4417 Hwy 20	Devils Lake	$155,687
NORTH DAKOTA STATE UNIVERSITY	Northern Tier Network Property	Garfield St	Dawson	$30,888
ADJUTANT GENERAL, CAMP GRAFTON	500 Gallon AST	4417 Hwy 20	Devils Lake	$12,884
NORTH DAKOTA STATE UNIVERSITY	Northern Tier Network Property	1823 N 16th St	Bismarck	$221,364
ADJUTANT GENERAL, CAMP GRAFTON	170x6' Fence @ Item #160	4417 Hwy 20	Devils Lake	$8,940

Description	Building Name	Address	City	Insured Amount
NORTH DAKOTA STATE UNIVERSITY	Northern Tier Network Property	County Rd 139	Glen Ullin	$30,888
ADJUTANT GENERAL, CAMP GRAFTON	Permanent Wash Bay Equip @ #160	4417 Hwy 20	Devils Lake	$238,681
NORTH DAKOTA STATE UNIVERSITY	Northern Tier Network Property	Corner of 36th SW & 105 Ave SW	Dickinson	$160,618
ADJUTANT GENERAL, CAMP GRAFTON	3-Poles with Lights @ #160	4417 Hwy 20	Devils Lake	$21,243
NORTH DAKOTA STATE UNIVERSITY	Northern Tier Network Property	6 Miles E on Old Hwy 10	Sentinel Butte	$30,888
ADJUTANT GENERAL, CAMP GRAFTON	1200 KW Standby Generator	4417 Hwy 20	Devils Lake	$651,763
NORTH DAKOTA STATE UNIVERSITY	Modular Block Fireplace	1200 University Dr N	Fargo	$19,379
NORTH DAKOTA STATE UNIVERSITY	Property @ Richard H Barry Hall	811 2nd Ave N	Fargo	$3,755,590
NORTH DAKOTA STATE UNIVERSITY	Property @ Klai Hall	711 2nd Ave N	Fargo	$2,336,966
NORTH DAKOTA STATE UNIVERSITY	Property @ Renaissance Hall	650 NP Ave	Fargo	$2,085,057
NORTH DAKOTA STATE UNIVERSITY	Property at Stop 'n Go Center	1919 N University Dr	Fargo	$913,449
NORTH DAKOTA STATE UNIVERSITY	6' Wood Fence @ President's Home	1200 University Dr N	Fargo	$29,661
NORTH DAKOTA STATE UNIVERSITY	8-Bollards @ President's Home	1200 University Dr N	Fargo	$10,822
NORTH DAKOTA STATE UNIVERSITY	3-Anchored Benches	1200 University Dr N	Fargo	$1,070
NORTH DAKOTA STATE UNIVERSITY	Northern Tier Network Property	635 8th Ave S	Wahpeton	$180,000
NORTH DAKOTA STATE UNIVERSITY	Fallen Bison Memorial	University Dr & Centennial Blvd	Fargo	$53,502
NORTH DAKOTA STATE UNIVERSITY	Hammer Discus Cage	Corner of 17th Ave N & 18th St N	Fargo	$45,076
NORTH DAKOTA STATE UNIVERSITY	Flag Plaza	Corner of 12th Ave N & 18th St N	Fargo	$43,916
NORTH DAKOTA STATE UNIVERSITY	NDSU Property at FargoDome	1800 N University Ave	Fargo	$1,381,846
NORTH DAKOTA STATE UNIVERSITY	Rented Office Location Upper Great Plains	555 1/2 E Broadway	Bismarck	$136,454
NORTH DAKOTA STATE UNIVERSITY	School of Nursing Property	512 N 7th St	Bismarck	$649,444
NORTH DAKOTA STATE UNIVERSITY	NDSU Illuminated Sign	SW corner 17th Ave N & University Dr N	Fargo	$72,650
NORTH DAKOTA STATE UNIVERSITY	36-Blue Light Emergency Phones	Addresses on file	Fargo	$223,762
NORTH DAKOTA STATE UNIVERSITY	Pay Stations with Shelter	1 @ 1517 12th Ave N	Fargo	$90,562
NORTH DAKOTA STATE UNIVERSITY	Soccer Scoreboard	1310 17th Ave N	Fargo	$21,539

Description	Building Name	Address	City	Insured Amount
NORTH DAKOTA STATE UNIVERSITY	S & T Training Center Contents	1305 19th Ave N	Fargo	$79,549
ADJUTANT GENERAL, CAMP GRAFTON	Communication Tower	4417 Hwy 20	Devils Lake	$449,100
NORTH DAKOTA STATE UNIVERSITY	Sanford - NRI	120 8th St S	Fargo	$31,407
UNIVERSITY OF NORTH DAKOTA	Ray Richards Driving Range Fence	3501 Demers Ave	Grand Forks	$103,295
NORTH DAKOTA STATE UNIVERSITY	Betterments & Improvements/Generator	1805 Research Park Dr	Fargo	$1,920,795
NORTH DAKOTA STATE UNIVERSITY	Scoreboard	1750 17th Ave N	Fargo	$61,631
NORTH DAKOTA STATE UNIVERSITY	Electrical equipment for Grandstand and Pressbox	1700 17th Ave N	Fargo	$12,960
NORTH DAKOTA STATE UNIVERSITY	3D Fuel (Mechanical Eng. Dept.)	222 7th AVE N	Fargo	$218,286
NORTH DAKOTA STATE UNIVERSITY	Northern Tier Network Property	4301 18TH AVE. S.	GRAND FORKS	$137,049
NORTH DAKOTA STATE UNIVERSITY	Bison Court-CAT 100 KW Generator	1440 University Dr	Fargo	$38,000
NORTH DAKOTA STATE UNIVERSITY	CAT 750KW Generator @ Research Building I Addition	1735 NDSU Research Park Dr	Fargo	$185,000
NORTH DAKOTA STATE UNIVERSITY	CAT 40KW Generator @ University Village	1745 University Dr N	Fargo	$28,000
NORTH DAKOTA STATE UNIVERSITY	KATOLIGHT 50KW Generator @ BBFH/Stockbridge	1301 Centennial Blvd	Fargo	$32,000
NORTH DAKOTA STATE UNIVERSITY	KOHLER 35KW Generator @ Mathew Living Learning Center	1435 18th ST N	Fargo	$26,000
NORTH DAKOTA STATE UNIVERSITY	MTU 600KW Generator @ WDC/High Rises	1500 15th Ave N	Fargo	$110,000
NORTH DAKOTA STATE UNIVERSITY	ONAN 250KW Generator @ AGHC/EML/Churchill	1306 Centennial Blvd	Fargo	$70,000
NORTH DAKOTA STATE UNIVERSITY	Fencing & Scoreboard	1701 15th Ave N	Fargo	$432,876
ND PARKS AND RECREATION DEPARTMENT	Mobile Home	2090-021 13571 Hwy 5	Cavalier	$593
UNIVERSITY OF NORTH DAKOTA	1800 KW Diesel EERC Generator	15 23rd St N	Grand Forks	$1,115,581
ND PARKS AND RECREATION DEPARTMENT	Office Property	2560-001 101 5th St	Walhalla	$2,196
UNIVERSITY OF NORTH DAKOTA	Paging Twr/Antenna/Cable	3791 Campus Road	Grand Forks	$61,491
UNIVERSITY OF NORTH DAKOTA	Minot Center for Family Practice	1201 11th Ave SW	Minot	$912,156
ND PARKS AND RECREATION DEPARTMENT	Park Manager Trailer	1403 River Road	Center	$0
UNIVERSITY OF NORTH DAKOTA	Police Tower/Antenna	3791 Campus Road	Grand Forks	$3,750

Description	Building Name	Address	City	Insured Amount
ND PARKS AND RECREATION DEPARTMENT	Medora Mobile Office	1465 36th St	Medora	$0
ND PARKS AND RECREATION DEPARTMENT	Killdeer Mobile Office	910 103rd Ave NW	Killdeer	$0
UNIVERSITY OF NORTH DAKOTA	2-High Mast Lights @ Chester Fritz	3475 University Ave	Grand Forks	$78,167
UNIVERSITY OF NORTH DAKOTA	1-High Mast Light @ Aerospace	South & West of Streibel Hall	Grand Forks	$28,113
UNIVERSITY OF NORTH DAKOTA	Aviation Line Support Facility	2772 Airport Dr	Grand Forks	$186,900
UNIVERSITY OF NORTH DAKOTA	Altru Hospital Property	1200 S Columbia Road	Grand Forks	$9,273
UNIVERSITY OF NORTH DAKOTA	Fargo VA Hospital Contents	1919 Elm St	Fargo	$7,000
ND PARKS AND RECREATION DEPARTMENT	North FEMA Trailer	13571 Highway 5	Cavalier	$0
UNIVERSITY OF NORTH DAKOTA	Belfield Anthropology Contents	209 2nd St SW	Belfield	$59,682
ND PARKS AND RECREATION DEPARTMENT	South FEMA Trailer	13571 Highway 5	Cavalier	$0
UNIVERSITY OF NORTH DAKOTA	Personal Property @ R. E. Arena	801 North Columbia Road	Grand Forks	$2,134,723
UNIVERSITY OF NORTH DAKOTA	Research Trailer	1900 N 36th St	Grand Forks	$0
UNIVERSITY OF NORTH DAKOTA	UND Sign	University Ave & N 25th St	Grand Forks	$46,441
UNIVERSITY OF NORTH DAKOTA	3-1825 kw Generators & Transformers*	3791 Campus Road	Grand Forks	$3,091,685
UNIVERSITY OF NORTH DAKOTA	Chester Fritz Library Sign	3051 University Ave	Grand Forks	$34,908
UNIVERSITY OF NORTH DAKOTA	720'x6' Chain Link Fence	South & West of 15 N 23rd St	Grand Forks	$16,239
UNIVERSITY OF NORTH DAKOTA	85'x4' Chain Link Fence	15 N 23rd St	Grand Forks	$630
UNIVERSITY OF NORTH DAKOTA	190x6' Cedar Fence	15 N 23rd St	Grand Forks	$5,294
UNIVERSITY OF NORTH DAKOTA	252'x6' Metal Fence/Sliding Gate	15 N 23rd St	Grand Forks	$21,963
UNIVERSITY OF NORTH DAKOTA	18-Emergency Blue Light Systems*	Locations in file	Grand Forks	$318,850
UNIVERSITY OF NORTH DAKOTA	Non-Electronic Sign @ Chester Fritz	3475 University Ave	Grand Forks	$8,902
UNIVERSITY OF NORTH DAKOTA	Jacobi Tennis Court Fence	6th Ave N & Princeton	Grand Forks	$22,338
UNIVERSITY OF NORTH DAKOTA	EERC Sign	2nd Ave North	Grand Forks	$43,869

Description	Building Name	Address	City	Insured Amount
UNIVERSITY OF NORTH DAKOTA	Human Nutrition Research Center	2420 2nd Ave N	Grand Forks	$5,637
UNIVERSITY OF NORTH DAKOTA	Property located at Ina Mae Rude	4200 James Ray Dr	Grand Forks	$14,817
UNIVERSITY OF NORTH DAKOTA	Aerospace Hangar #6 Sign	2810 Airport Dr	Grand Forks	$42,438
UNIVERSITY OF NORTH DAKOTA	53-Double Head Meters*	Locations in file	Grand Forks	$98,542
UNIVERSITY OF NORTH DAKOTA	8-Single Head Meters*	Locations in file	Grand Forks	$4,902
UNIVERSITY OF NORTH DAKOTA	Hilton Garden Inn Single Sided Sign	4301 Darmouth Dr	Grand Forks	$2,539
UNIVERSITY OF NORTH DAKOTA	Transportation Yard Fence/Cameras	3825 Campus Road	Grand Forks	$90,841
UNIVERSITY OF NORTH DAKOTA	Ramp Sign	Columbia Road & 2nd Ave N	Grand Forks	$96,409
UNIVERSITY OF NORTH DAKOTA	4-High Mast Parking Lot Lights	6th Ave & Princeton	Grand Forks	$385,036
UNIVERSITY OF NORTH DAKOTA	4-Omnidirectional Sirens	Locations in file	Grand Forks	$150,160
UNIVERSITY OF NORTH DAKOTA	12-Shuttle Bus Stop Signs	Locations in file	Grand Forks	$49,253
UNIVERSITY OF NORTH DAKOTA	1000 kw Generator	801 Princeton St	Grand Forks	$621,140
UNIVERSITY OF NORTH DAKOTA	Outdoor Dish Antenna	3925 Campus Road	Grand Forks	$69,874
UNIVERSITY OF NORTH DAKOTA	Luke Paystation/2-Signs	250 Centennial Dr	Grand Forks	$23,607
UNIVERSITY OF NORTH DAKOTA	Double Sided Monument Sign	S 42nd St & James Ray Dr	Grand Forks	$39,037
UNIVERSITY OF NORTH DAKOTA	KU Band Antenna	4251 University Ave	Grand Forks	$89,473
UNIVERSITY OF NORTH DAKOTA	Aurora Pathology Dept	1451 44th Ave S Ste C	Grand Forks	$620,497
UNIVERSITY OF NORTH DAKOTA	Satellite Dish	3925 Campus Road	Grand Forks	$50,406
UNIVERSITY OF NORTH DAKOTA	Clock	Twamley Quad on Centennial Dr	Grand Forks	$34,052
UNIVERSITY OF NORTH DAKOTA	Gate Control with Camera	2nd Ave North	Grand Forks	$20,383
UNIVERSITY OF NORTH DAKOTA	150 kw Generator	221 Centennial Dr	Grand Forks	$107,076
UNIVERSITY OF NORTH DAKOTA	College of Nursing Sign	430 Oxford St	Grand Forks	$4,179
UNIVERSITY OF NORTH DAKOTA	Soccer Scoreboard	N Columbia Rd & Sixth Ave N	Grand Forks	$45,395
UNIVERSITY OF NORTH DAKOTA	4-Soccer Shelters	N Columbia Rd & Sixth Ave N	Grand Forks	$21,800
UNIVERSITY OF NORTH DAKOTA	Trailer/Interior Equipment	1652 23rd St NE	Emerado	$76,737

Description	Building Name	Address	City	Insured Amount
UNIVERSITY OF NORTH DAKOTA	Oakville Conservation Site Sign	1652 23rd St NE	Emerado	$3,976
UNIVERSITY OF NORTH DAKOTA	Observatory #2 & Interior Equipment	1652 23rd St NE	Emerado	$74,706
UNIVERSITY OF NORTH DAKOTA	Observatory #3 & Interior Equipment	1652 23rd St NE	Emerado	$81,231
UNIVERSITY OF NORTH DAKOTA	Property at Leased Building	2610 Airport Road	Grand Forks	$284,155
UNIVERSITY OF NORTH DAKOTA	Raised Frame Platform	1652 23rd St NE	Emerado	$7,312
UNIVERSITY OF NORTH DAKOTA	UND Lettering on Hilton Skywalk	4300 Darmounth Dr	Grand Forks	$17,022
UNIVERSITY OF NORTH DAKOTA	Dumpster Enclosure	264 Centennial Dr	Grand Forks	$16,510
UNIVERSITY OF NORTH DAKOTA	Playground Equipment	525 Stanford Rd	Grand Forks	$15,820
UNIVERSITY OF NORTH DAKOTA	Playground Equipment	North of 500 Tulane	Grand Forks	$13,447
UNIVERSITY OF NORTH DAKOTA	Playground Equipment	North of 520 Tulane	Grand Forks	$7,909
UNIVERSITY OF NORTH DAKOTA	Playground Equipment	W of 301-401 Tulane Ct	Grand Forks	$15,820
UNIVERSITY OF NORTH DAKOTA	Playground Equipment	Behind 110 State St/3600 Campus Rd	Grand Forks	$15,820
UNIVERSITY OF NORTH DAKOTA	110' of Chain Link Fence	3791 Campus Road	Grand Forks	$4,757
UNIVERSITY OF NORTH DAKOTA	Center for Family Medicine	701 E Rosser Ave	Bismarck	$1,458,474
UNIVERSITY OF NORTH DAKOTA	Property at Gorecki Alumni Center	3501 University Ave	Grand Forks	$549,139
UNIVERSITY OF NORTH DAKOTA	Contents of Helicopter Operations Cntr	2700 Airport Dr	Grand Forks	$167,727
UNIVERSITY OF NORTH DAKOTA	Martens Observation Site	3350 40th St NE	Inkster	$135,359
UNIVERSITY OF NORTH DAKOTA	Minot Leased Office Space	420 3rd St SE Ste B	Minot	$106,593
UNIVERSITY OF NORTH DAKOTA	140'x8' Decorative Metal Fence	3701 Campus Road	Grand Forks	$31,588
UNIVERSITY OF NORTH DAKOTA	Property @ Aviation Hanger 300	2521 Airport Dr	Grand Forks	$66,009
ND DEPT OF INFORMATION TECHNOLOGY	ITD Equipment	308 1st St NW	Mandan	$5,998,579
UNIVERSITY OF NORTH DAKOTA	Light Fixtures Throughout Campus	Locations on File	Grand Forks	$1,133,415
UNIVERSITY OF NORTH DAKOTA	Property at Multi-Band Bldg	2000 44th St SW	Fargo	$26,378
UNIVERSITY OF NORTH DAKOTA	Fence around Outdoor Kiln	3350 Campus Road	Grand Forks	$7,005
UNIVERSITY OF NORTH DAKOTA	Wilkerson Commons Fence	3450 University Ave	Grand Forks	$33,373

Description	Building Name	Address	City	Insured Amount
UNIVERSITY OF NORTH DAKOTA	UND Property at Robin Hall	4275 University Ave	Grand Forks	$3,598,750
ND DEPT OF INFORMATION TECHNOLOGY	ITD Equipment	24 2nd Ave SE	Minot	$285,346
UNIVERSITY OF NORTH DAKOTA	Petroleum Engineering Department	1830 State Mill Road	Grand Forks	$4,482,364
UNIVERSITY OF NORTH DAKOTA	Contents @ Office in Emerado	1213 Ladyhawk Drive	Emerado	$857,506
UNIVERSITY OF NORTH DAKOTA	12-Decorative Lighted Columns	University Ave		$420,000
ND DEPT OF INFORMATION TECHNOLOGY	ITD Equipment	3901 Great Plains Dr	Fargo	$2,526,923
UNIVERSITY OF NORTH DAKOTA	Contents @ 4-Storage Units	5118 Gateway Dr	Grand Forks	$4,000
UNIVERSITY OF NORTH DAKOTA	Gateway Arch w/ Light Fixtures	2nd Ave & Cornell	Grand Forks	$251,725
ND HOUSING FINANCE AGENCY	Modular Home	13836 Cottonwood St	Williston	$0
ND DEPT OF INFORMATION TECHNOLOGY	ITD Equipment	122 S 5th St	Grand Forks	$316,564
ND DEPT OF INFORMATION TECHNOLOGY	ITD Equipment	4202 Coleman St	Bismarck	$2,685,200
ND DEPT OF INFORMATION TECHNOLOGY	ITD Equipment	4201 Normandy St	Bismarck	$7,560,208
ND DEPT OF INFORMATION TECHNOLOGY	IT PP at DOT	608 E. Boulevard Ave.	Bismarck	$2,603,779
ND DEPT OF INFORMATION TECHNOLOGY	State Capitol Tower and Wire Closets	600 E. Boulevard Ave.	Bismarck	$867,126
ND DEPT OF INFORMATION TECHNOLOGY	ITD PP * Max location limit is $250,000	Anywhere in the state of ND *Schedule locations and limits are not covered by this item		$6,936,098
ND DEPT OF INFORMATION TECHNOLOGY	ITD Equipment	3301 E Main Ave	Bismarck	$289,158
ND DEPT OF INFORMATION TECHNOLOGY	ITD Equipment	1237 W Divide Ave	Bismarck	$373,940
ND DEPT OF INFORMATION TECHNOLOGY	ITD Equipment	2624 9th Ave S	Fargo	$415,727

Source: North Dakota Fire and Tornado Fund, 2023

D.8 Mobile Home Housing Units by Census Place

Community	County	Mobile Homes	Percentage of Housing Units that is Mobile Homes
Oak Creek Twp.	Bottineau	24	100%
Langberg Twp.	Bowman	10	100%
Gooseneck Twp.	Divide	8	100%
Liberty Twp.	Kidder	15	100%
Westford Twp.	Kidder	11	100%
Denbigh Twp.	McHenry	5	100%
East McKenzie Twp.	McKenzie	25	100%
Clearwater Twp.	Mountrail	30	100%
Oakland Twp.	Mountrail	14	100%
Scoville Twp.	Ransom	17	100%
Grano	Renville	1	100%
Plain Twp.	Renville	31	100%
Lansing Twp.	Towner	1	100%
Lynn Twp.	Wells	2	100%
Ellisville Twp.	Williams	4	100%
Rainbow Twp.	Williams	11	100%
Crown Hill Twp.	Kidder	25	89%
Sunny Slope Twp.	Bowman	8	89%
Carroll Twp.	Slope	8	89%
Jim River Valley Twp.	Stutsman	138	84%
Elm Tree Twp.	McKenzie	21	84%
Freeman Twp.	Richland	5	83%
Hebron Twp.	Williams	36	82%
Springbrook	Williams	9	82%
Liberty Twp.	Mountrail	79	81%
Ardoch	Walsh	40	80%
Judson Twp.	Williams	98	79%
Southwest Mountrail Twp.	Mountrail	55	77%
Brooklyn Twp.	Williams	26	76%
Arnegard Twp.	McKenzie	55	76%
Porter Twp.	Dickey	12	75%
Broadlawn Twp.	Steele	29	74%
Vanville Twp.	Burke	14	74%
Van Hook Twp.	Mountrail	291	71%
Byron Twp.	Cavalier	15	71%
Kottke Valley Twp.	McHenry	7	70%
Stoneview Twp.	Divide	11	69%
Owego Twp.	Ransom	15	68%
Odessa Twp.	Ramsey	23	68%

Community	County	Mobile Homes	Percentage of Housing Units that is Mobile Homes
Kohlmeier Twp.	Rolette	9	64%
West Mountrail Twp.	Mountrail	130	63%
Haaland Twp.	Wells	15	63%
Eldred Twp.	Cass	13	62%
Conway	Walsh	21	62%
Saline Twp.	McHenry	16	62%
Tolley	Renville	16	62%
Mylo	Rolette	11	61%
Ypsilanti Twp.	Stutsman	14	61%
Alex Twp.	McKenzie	88	61%
Talbot Twp.	Bowman	23	61%
Ghylin Twp.	Burleigh	12	60%
Central Hettinger Twp.	Hettinger	6	60%
Rosemeade Twp.	Ransom	21	60%
Cedar Creek Twp.	Slope	16	59%
Denhoff Twp.	Sheridan	13	59%
Egg Creek Twp.	McHenry	11	58%
Fort Berthold Twp.	Dunn	255	57%
Lake Town Twp.	Barnes	8	57%
Raney Twp.	LaMoure	8	57%
Hawkeye Twp.	McKenzie	16	57%
Monroe Twp.	Towner	16	57%
Grenora Twp.	Williams	4	57%
Oakville Twp.	Grand Forks	46	56%
Moord Twp.	Slope	11	55%
Cash Twp.	Slope	6	55%
Minnie Lake Twp.	Barnes	7	54%
Carpio Twp.	Ward	21	54%
Southeast Williams Twp.	Williams	59	54%
Casey Twp.	Ransom	34	53%
Haley Twp.	Bowman	12	52%
Castle Rock Twp.	Hettinger	13	52%
Hanson Twp.	Ransom	18	51%
Butte Valley Twp.	Benson	21	51%
Sauk Valley Twp.	Williams	64	51%
Crane Creek Twp.	Mountrail	38	51%
Wales	Cavalier	3	50%
Keystone Twp.	Dickey	3	50%
Freda Twp.	Grant	12	50%
Hurley Twp.	Renville	19	50%
Amidon	Slope	12	50%

Community	County	Mobile Homes	Percentage of Housing Units that is Mobile Homes
Mandan Twp.	Ward	5	50%
Driscoll Twp.	Burleigh	38	49%
Fried Twp.	Stutsman	21	48%
Tri Twp.	McKenzie	40	48%
Twin Valley Twp.	McKenzie	83	47%
Northland Twp.	Ransom	13	46%
Helena Twp.	Griggs	12	46%
Rochester Twp.	Cass	5	45%
Gardar Twp.	Pembina	15	45%
Pingree	Stutsman	20	45%
Dawson	Kidder	24	45%
Howie Twp.	Mountrail	14	45%
Lallie Twp.	Benson	77	45%
Sorkness Twp.	Mountrail	4	44%
Manfred Twp.	Wells	15	44%
East McLean Twp.	McLean	64	44%
Brampton Twp.	Sargent	10	43%
Emerado	Grand Forks	127	43%
Otis Twp.	McLean	34	43%
Scott Twp.	Adams	3	43%
Twin Lake Twp.	Benson	3	43%
Hamlin Twp.	Nelson	12	43%
Warwick Twp.	Benson	14	42%
Tanner Twp.	Kidder	8	42%
Denver Twp.	Sargent	8	42%
Blacktail Twp.	Williams	37	42%
Starbuck Twp.	Bottineau	5	42%
Ludden	Dickey	5	42%
Milnor Twp.	Sargent	7	41%
Des Lacs	Ward	37	39%
Anna Twp.	Ward	7	39%
Pick City	Mercer	62	38%
Sibley Twp.	Kidder	74	38%
North Prairie Twp.	McHenry	14	38%
Kandiyohi Twp.	Burke	9	38%
Lindahl Twp.	Williams	24	38%
Oliver Twp.	Williams	3	38%
Hart Twp.	Bowman	4	36%
Lark Twp.	Grant	8	36%
Plaza Twp.	Mountrail	8	36%
Golden Lake Twp.	Steele	59	36%

Community	County	Mobile Homes	Percentage of Housing Units that is Mobile Homes
Wolf Butte Twp.	Adams	5	36%
Avon Twp.	Grand Forks	15	36%
Beery Twp.	Hettinger	5	36%
St. Andrews Twp.	Walsh	5	36%
West Grant Twp.	Grant	165	35%
Deering Twp.	McHenry	31	35%
Cleveland	Stutsman	19	35%
Fremont Twp.	Cavalier	13	35%
Getchell Twp.	Barnes	14	35%
Eden Valley Twp.	Renville	14	35%
Tewaukon Twp.	Sargent	14	35%
Prophets Twp.	Sheridan	7	35%
Ryder Twp.	Ward	7	35%
Pleasant Valley Twp.	Williams	15	35%
Elkmount Twp.	Grand Forks	11	34%
Wise Twp.	McLean	75	34%
Tuttle Twp.	Kidder	17	34%
Clear Lake Twp.	Kidder	21	34%
Poplar Grove Twp.	Ramsey	31	34%
St. John	Rolette	34	34%
Thelma Twp.	Burleigh	1	33%
Nekoma	Cavalier	5	33%
Riga Twp.	McHenry	13	33%
Wagar Twp.	McHenry	6	33%
Lowland Twp.	Mountrail	6	33%
Rock Lake Twp.	Towner	3	33%
Wood Lake Twp.	Benson	95	33%
Oriska	Barnes	23	33%
Excelsior Twp.	Kidder	16	33%
Belfield	Stark	159	33%
Shell Twp.	Mountrail	13	33%
Cordelia Twp.	Bottineau	9	32%
Solon Twp.	Hettinger	9	32%
Roseville Twp.	Traill	18	32%
Rye Twp.	Grand Forks	61	32%
Deering	McHenry	14	32%
Solen	Sioux	11	31%
Yellowstone Twp.	McKenzie	100	31%
Anderson Twp.	Barnes	5	31%
Martin Twp.	Sheridan	10	31%
Midland Twp.	Pembina	14	31%

Community	County	Mobile Homes	Percentage of Housing Units that is Mobile Homes
Venturia	McIntosh	9	31%
Cleary Twp.	Burke	7	30%
Kent Twp.	Dickey	7	30%
Hagel Twp.	Pierce	16	30%
Mount Rose Twp.	Bottineau	3	30%
Wilton	Burleigh	21	30%
Bentru Twp.	Grand Forks	3	30%
Sealy Twp.	Logan	9	30%
Minco Twp.	Benson	8	30%
Souris	Bottineau	13	30%
Elliott Twp.	Ransom	5	29%
Mission Twp.	Benson	68	29%
Pherrin Twp.	Williams	75	29%
Petersville Twp.	Kidder	7	29%
Central McKenzie Twp.	McKenzie	311	29%
Telfer Twp.	Burleigh	11	29%
Makoti	Ward	17	29%
West Stark Twp.	Stark	109	29%
West Hope Twp.	Cavalier	10	29%
Black Butte Twp.	Hettinger	4	29%
Baker Twp.	Kidder	2	29%
Victor Twp.	Towner	6	29%
Ree Twp.	Ward	2	29%
Wells Twp.	Wells	8	29%
Lohnes Twp.	Benson	27	28%
Maple River Twp.	Cass	15	28%
Whitteron Twp.	Bottineau	68	28%
Gilstrap Twp.	Adams	9	28%
Raleigh Twp.	Grant	7	28%
Courtenay	Stutsman	7	28%
East Mercer Twp.	Mercer	164	28%
Crystal Springs Twp.	Kidder	5	28%
Southeast McKenzie Twp.	McKenzie	61	28%
Sergius Twp.	Bottineau	8	28%
Granville	McHenry	33	28%
Tappen	Kidder	32	27%
Ray Twp.	LaMoure	9	27%
Hamberg	Wells	3	27%
Turtle Mountain Twp.	Rolette	502	27%
Dunn Center	Dunn	42	27%
Bjornson Twp.	McHenry	10	27%

Community	County	Mobile Homes	Percentage of Housing Units that is Mobile Homes
Spring Creek Twp.	Barnes	8	27%
Mountain	Pembina	8	27%
Flint Twp.	Stutsman	4	27%
St. Paul Twp.	Stutsman	4	27%
Berlin Twp.	Cass	18	26%
Southwest Twp.	Sargent	5	26%
Fort Berthold Twp.	McLean	96	26%
Starkweather	Ramsey	12	26%
Eureka Twp.	Ward	26	26%
Menoken Twp.	Burleigh	21	26%
Fort Yates	Sioux	14	26%
Marshall Twp.	Williams	7	26%
Sherwood	Renville	36	26%
South Dunn Twp.	Dunn	89	26%
Haynes	Adams	8	26%
Pisek	Walsh	17	26%
Florance Twp.	Foster	20	26%
McKenzie Twp.	Burleigh	12	26%
Selfridge	Sioux	17	25%
Munster Twp.	Eddy	4	25%
Woodlawn Twp.	Kidder	7	25%
Loquemont Twp.	McLean	7	25%
Palermo	Mountrail	19	25%
Balta	Pierce	12	25%
Taylor Twp.	Sargent	2	25%
Paris Twp.	Stutsman	3	25%
Eden Twp.	Walsh	4	25%
Vernon Twp.	Kidder	15	25%
Newburgh Twp.	Steele	14	25%
Coleharbor	McLean	13	25%
Antelope Creek Twp.	McKenzie	12	24%
Hansboro	Towner	6	24%
Crystal Lake Twp.	Wells	5	24%
Epping	Williams	13	23%
Manilla Twp.	Cavalier	6	23%
Rose Hill Twp.	Foster	9	23%
Crary	Ramsey	9	23%
Bingham Twp.	Traill	6	23%
Taylor	Stark	23	23%
White Earth	Mountrail	8	23%
Clear Lake Twp.	Burleigh	5	23%

Community	County	Mobile Homes	Percentage of Housing Units that is Mobile Homes
Elm Grove Twp.	Grand Forks	16	23%
Helendale Twp.	Richland	11	22%
South Sheridan Twp.	Sheridan	15	22%
St. Croix Twp.	Hettinger	4	22%
Flaxton	Burke	19	22%
Foothills Twp.	Burke	7	22%
Pleasant Twp.	Cass	26	22%
Wamduska Twp.	Nelson	5	22%
North Creel Twp.	Ramsey	26	22%
Warwick	Benson	8	22%
East Grant Twp.	Grant	58	22%
Dickinson South Twp.	Stark	77	22%
Kennedy Twp.	Hettinger	3	21%
South Minnewaukan Twp.	Ramsey	34	21%
North Pierce Twp.	Pierce	41	21%
Cogswell	Sargent	14	21%
Osnabrock Twp.	Cavalier	8	21%
Sioux Twp.	McKenzie	25	21%
Fort Totten Twp.	Benson	62	21%
Ray	Williams	77	21%
McKinney Twp.	Renville	19	20%
East Stark Twp.	Stark	65	20%
North Rolette Twp.	Rolette	250	20%
Sheldon	Ransom	14	20%
Broe Twp.	Benson	2	20%
Thorson Twp.	Burke	4	20%
Calvin	Cavalier	1	20%
Ambrose	Divide	5	20%
Balfour Twp.	McHenry	2	20%
Shenford Twp.	Ransom	9	20%
Lincoln Dale Twp.	Sheridan	2	20%
Finley Twp.	Steele	4	20%
Tioga Twp.	Williams	12	20%
Nedrose Twp.	Ward	165	20%
East Adams Twp.	Adams	18	20%
Pekin	Nelson	9	20%
Pontiac Twp.	Cass	7	19%
Northwest McIntosh Twp.	McIntosh	42	19%
Barney Twp.	Richland	12	19%
New England Twp.	Hettinger	11	19%
East Oliver Twp.	Oliver	75	19%

Community	County	Mobile Homes	Percentage of Housing Units that is Mobile Homes
South Heart	Stark	39	19%
Round Prairie Twp.	Williams	32	19%
Warren Twp.	Cass	8	19%
Levant Twp.	Grand Forks	8	19%
Glenfield	Foster	11	19%
Farmington Twp.	Walsh	7	19%
South Emmons Twp.	Emmons	87	19%
Sundre Twp.	Ward	83	19%
Bowbells Twp.	Burke	3	19%
Ecklund Twp.	Burleigh	12	19%
Alice	Cass	3	19%
Superior Twp.	Eddy	3	19%
Braddock	Emmons	3	19%
Estabrook Twp.	Foster	9	19%
Campbell Twp.	Hettinger	6	19%
Rifle Twp.	Hettinger	3	19%
Lawton Twp.	Ramsey	3	19%
Strandahl Twp.	Williams	6	19%
Freeborn Twp.	Eddy	8	19%
Scorio Twp.	Williams	5	19%
Sibley Trail Twp.	Barnes	31	18%
Long Lake Twp.	Burleigh	13	18%
Kathryn	Barnes	8	18%
Hannah	Cavalier	2	18%
Plaza	Mountrail	20	18%
Brandenburg Twp.	Richland	14	18%
Homestead Twp.	Richland	8	18%
Deep Creek Twp.	Slope	2	18%
Heimdal Twp.	Wells	6	18%
Amenia	Cass	12	18%
North McKenzie Twp.	McKenzie	72	18%
Fort Berthold Twp.	McKenzie	113	18%
Stewart Twp.	Barnes	3	18%
Gardena	Bottineau	3	18%
Tower Twp.	Cass	3	18%
Lebanon Twp.	McHenry	3	18%
West Slope Twp	Slope	3	18%
Carpenter Twp.	Steele	3	18%
Empire Twp.	Cass	10	18%
Killdeer Twp.	Dunn	56	18%
Sawyer Twp.	Ward	15	17%

Community	County	Mobile Homes	Percentage of Housing Units that is Mobile Homes
Allendale Twp.	Grand Forks	34	17%
Montpelier	Stutsman	9	17%
Medora	Billings	23	17%
West Mercer Twp.	Mercer	74	17%
Connor Twp.	Slope	5	17%
Walters Twp.	Stutsman	5	17%
Ellendale Twp.	Dickey	16	17%
Walcott	Richland	23	17%
North Billings Twp.	Billings	43	17%
Glenview Twp.	Burleigh	15	17%
Woodbury Twp.	Stutsman	18	17%
Glenwood Twp.	Walsh	20	17%
Freshwater Twp.	Ramsey	9	17%
Elliott	Ransom	3	17%
Manns Twp.	Stutsman	4	17%
Berthold	Ward	32	17%
Rhame	Bowman	18	16%
Underwood Twp.	McLean	26	16%
Gladstone	Stark	26	16%
North Viking Twp.	Benson	8	16%
Robinson	Kidder	7	16%
Clifton Twp.	Cass	6	16%
Fullerton	Dickey	6	16%
Hazen	Mercer	203	16%
Forest River	Walsh	11	16%
Blooming Twp.	Grand Forks	19	16%
South Rolette Twp.	Rolette	19	16%
Delhi Twp.	Golden Valley	3	16%
Charbon Twp.	McKenzie	6	16%
Pipestem Valley Twp.	Stutsman	3	16%
Foxholm Twp.	Ward	9	16%
Mott Twp.	Hettinger	5	16%
Malcolm Twp.	McLean	13	15%
Rich Valley Twp.	Benson	2	15%
Pulaski Twp.	Walsh	2	15%
Osloe Twp.	Mountrail	7	15%
Killdeer	Dunn	69	15%
Sanborn	Barnes	10	15%
Golva	Golden Valley	10	15%
Henry Twp.	Golden Valley	3	15%
Bathgate	Pembina	3	15%

Community	County	Mobile Homes	Percentage of Housing Units that is Mobile Homes
Walsh Centre Twp.	Walsh	20	15%
Elmdale Twp.	Ward	4	15%
Walburg Twp.	Cass	10	15%
Kirkelie Twp.	Ward	31	15%
New Town	Mountrail	159	15%
Duck Creek Twp.	Adams	6	15%
Pettibone	Kidder	6	15%
North Emmons Twp.	Emmons	74	15%
Pembina Twp.	Pembina	7	15%
Wing	Burleigh	15	14%
Springbrook Twp.	Williams	16	14%
Verona	LaMoure	6	14%
Forest River Twp.	Walsh	3	14%
Scotia Twp.	Bottineau	11	14%
Ryder	Ward	9	14%
Minto	Walsh	41	14%
Noltimier Twp.	Barnes	5	14%
White Twp.	Pierce	5	14%
East Morton Twp.	Morton	172	14%
Spring Grove Twp.	McHenry	4	14%
Tappen Twp.	Kidder	7	14%
Twin Tree Twp.	Benson	3	14%
Noonan	Divide	20	14%
Climax Twp.	Williams	10	14%
Hague	Emmons	9	13%
Parshall	Mountrail	75	13%
Colville Twp.	Burke	4	13%
Whitestone Hill Twp.	Sargent	2	13%
St. Thomas	Pembina	25	13%
Amenia Twp.	Cass	9	13%
Landa	Bottineau	5	13%
Clay Twp.	Renville	5	13%
Fordville	Walsh	14	13%
Forbes	Dickey	3	13%
Great Bend	Richland	3	13%
Bloomenfield Twp.	Stutsman	3	13%
Ardoch Twp.	Walsh	6	13%
Milton	Cavalier	4	13%
Alexander	McKenzie	16	13%
Osborn Twp.	Mountrail	6	13%
Crystal	Pembina	9	13%

Community	County	Mobile Homes	Percentage of Housing Units that is Mobile Homes
Harriet-Lein Twp.	Burleigh	3	13%
Fertile Twp.	Mountrail	4	13%
Spring Coulee Twp.	Mountrail	6	13%
Liberty Grove Twp.	Richland	3	13%
East Logan Twp.	Logan	18	12%
Americus Twp.	Grand Forks	8	12%
North Sioux Twp.	Sioux	43	12%
Wheatland Twp.	Cass	10	12%
Dickinson North Twp.	Stark	149	12%
Jud	LaMoure	4	12%
Carlisle Twp.	Pembina	4	12%
Sperry/Goodrich Twp.	Sheridan	4	12%
Ferry Twp.	Grand Forks	15	12%
Silver Lake Twp.	Wells	3	12%
Grenora	Williams	24	12%
Gwinner	Sargent	52	12%
Tuttle city	Kidder	8	12%
Crosby	Divide	71	12%
Lawton	Ramsey	5	12%
Willow City	Bottineau	14	12%
Vivian Twp.	Sargent	7	12%
Akra Twp.	Pembina	11	12%
Ward Twp.	Burke	2	12%
Karlsruhe	McHenry	4	12%
Sikes Twp.	Mountrail	2	12%
Bloomfield Twp.	Traill	4	12%
Halliday Twp.	Dunn	29	12%
Mandan	Morton	1305	12%
Missouri Ridge Twp.	Williams	50	12%
Fancher Twp.	Ramsey	3	12%
Abercrombie Twp.	Richland	14	11%
Midway Twp.	Stutsman	29	11%
Cherry Lake Twp.	Eddy	4	11%
Montpelier Twp.	Stutsman	4	11%
Newburg	Bottineau	5	11%
Buford Twp.	Williams	5	11%
Lucy Twp.	Burke	4	11%
Cornell Twp.	Cass	4	11%
Larrabee Twp.	Foster	2	11%
Herman Twp.	Sargent	3	11%
Bowdon	Wells	13	11%

Community	County	Mobile Homes	Percentage of Housing Units that is Mobile Homes
Trenton Twp.	Williams	36	11%
Arvilla Twp.	Grand Forks	20	11%
East McIntosh Twp.	McIntosh	19	11%
West McLean Twp.	McLean	16	11%
Wold Twp.	Traill	3	11%
Anamoose	McHenry	16	11%
Kinyon Twp.	Cass	5	11%
Abercrombie Twp.	Richland	17	11%
Center	Oliver	25	11%
Wyndmere Twp.	Richland	2	11%
New Leipzig	Grant	12	10%
Dover Twp.	Griggs	3	10%
Milnor	Sargent	36	10%
Lincoln	Burleigh	146	10%
Stanton	Mercer	25	10%
Wright Twp.	Dickey	4	10%
Victoria Twp.	McLean	4	10%
South Billings Twp.	Billings	11	10%
Southwest Sioux Twp.	Sioux	12	10%
Medina	Stutsman	19	10%
Sheyenne	Eddy	14	10%
Knox Twp.	Benson	1	10%
Antler Twp.	Bottineau	3	10%
Dale Twp.	Burke	1	10%
Westby Twp.	Divide	2	10%
McKinnon Twp.	Foster	1	10%
Adams	Walsh	7	10%
Larimore	Grand Forks	62	10%
Hegton Twp.	Grand Forks	11	10%
Sterling Twp.	Burleigh	7	10%
Reynolds	Traill	10	10%
Goodrich	Sheridan	9	10%
Sawyer	Ward	12	10%
Litchville Twp.	LaMoure	2	10%
Fredonia	Logan	2	10%
Hamilton	Pembina	2	10%
Webster Twp.	Ramsey	2	10%
Fairdale	Walsh	2	10%
Stony Creek Twp.	Williams	18	10%
Glenburn	Renville	20	9%
Crofte Twp.	Burleigh	8	9%

Community	County	Mobile Homes	Percentage of Housing Units that is Mobile Homes
Scranton	Bowman	18	9%
Carpio	Ward	7	9%
Fort Yates Twp.	Sioux	58	9%
Steele	Kidder	40	9%
Eldon Twp.	Benson	3	9%
Lansford	Bottineau	11	9%
Newland Twp.	Ramsey	1	9%
Speedwell Twp.	Wells	2	9%
Truax Twp.	Williams	11	9%
Douglas	Ward	9	9%
Horace	Cass	116	9%
Williams Twp.	Nelson	5	9%
Advance Twp.	Pembina	5	9%
Dunseith	Rolette	29	9%
Parshall Twp.	Mountrail	4	9%
Neche	Pembina	12	9%
Powers Twp.	Mountrail	3	9%
Tioga	Williams	92	9%
Albert Twp.	Benson	2	9%
Rocklake	Towner	7	9%
Dazey	Barnes	5	9%
Velva	McHenry	39	9%
Morton Twp.	Burleigh	3	9%
Mercer	McLean	6	9%
North Sheridan Twp.	Sheridan	12	9%
Edmunds Twp.	Stutsman	3	9%
Roland Twp.	Bottineau	91	8%
Cavalier	Pembina	65	8%
Maddock	Benson	21	8%
Homen Twp.	Bottineau	13	8%
West End Twp.	Richland	1	8%
Boone Twp.	Sheridan	1	8%
Surrey Twp.	Ward	10	8%
Halliday	Dunn	14	8%
New Prairie Twp.	Ward	15	8%
Missouri Twp.	Burleigh	7	8%
Minot	Ward	1928	8%
Elgin Twp.	Cavalier	6	8%
Max	McLean	8	8%
Bismarck	Burleigh	2724	8%
Gardner	Cass	3	8%

Community	County	Mobile Homes	Percentage of Housing Units that is Mobile Homes
Almont	Morton	6	8%
Reeder	Adams	8	8%
Battleview Twp.	Burke	5	8%
Washburn	McLean	60	8%
West Oliver Twp.	Oliver	22	8%
Mohall	Renville	24	8%
Bowman	Bowman	69	8%
Trygg Twp.	Burleigh	1	8%
LaMars Twp.	Richland	4	8%
Havana	Sargent	3	8%
West Morton Twp.	Morton	30	8%
Upham	McHenry	8	8%
East Rolette Twp.	Rolette	15	8%
Butte	McLean	5	8%
Lodema Twp.	Pembina	5	8%
Turtle River Twp.	Grand Forks	4	8%
Dundee Twp.	Walsh	3	8%
Watford City	McKenzie	273	7%
Rogers	Barnes	2	7%
Cottonwood Twp.	Mountrail	2	7%
Leonard	Cass	9	7%
Zap	Mercer	9	7%
Strabane Twp.	Grand Forks	3	7%
Devils Lake	Ramsey	280	7%
Kensington Twp.	Walsh	8	7%
Hebron	Morton	28	7%
Stanley	Mountrail	81	7%
Dodge	Dunn	3	7%
McHenry Twp.	Foster	2	7%
Northwood Twp.	Grand Forks	3	7%
Steiner Twp.	Hettinger	1	7%
Duerr Twp.	Richland	5	7%
Rice Lake Twp.	Ward	5	7%
Carson	Grant	17	7%
Southwest McKenzie Twp.	McKenzie	12	7%
Hankinson	Richland	28	7%
Richardton	Stark	29	7%
Riverdale	McLean	15	7%
Kramer	Bottineau	2	7%
Jamestown	Stutsman	518	7%
Maxbass	Bottineau	4	7%

Community	County	Mobile Homes	Percentage of Housing Units that is Mobile Homes
Newport Twp.	McHenry	6	7%
Buchanan Twp.	Stutsman	2	7%
Lankin	Walsh	5	7%
Hazelton	Emmons	9	6%
Tyrol Twp.	Griggs	4	6%
Rolette	Rolette	16	6%
South McLean Twp.	McLean	23	6%
Harlem Twp.	Sargent	4	6%
Streeter	Stutsman	5	6%
Wimbledon	Barnes	7	6%
Arne Twp.	Benson	2	6%
Arnegard	McKenzie	6	6%
Grandin	Cass	5	6%
Harriston Twp.	Walsh	5	6%
Taft Twp.	Burleigh	2	6%
Gilby	Grand Forks	8	6%
Fairmount	Richland	12	6%
Benedict	McLean	5	6%
Bear Creek Twp.	Dickey	7	6%
Wildrose	Williams	5	6%
Cavalier Twp.	Pembina	14	6%
Park River	Walsh	43	6%
Falconer Twp.	Grand Forks	6	6%
Michigan City	Nelson	10	6%
Dwight	Richland	1	6%
Rolla	Rolette	26	6%
Egeland	Towner	5	6%
Davenport	Cass	6	6%
Woodworth	Stutsman	2	6%
Valley City	Barnes	187	6%
Velva Twp.	McHenry	5	6%
Kensal	Stutsman	5	6%
Ashtabula Twp.	Barnes	8	6%
Walshville Twp.	Walsh	3	6%
Golden Valley	Mercer	8	6%
Norwich Twp.	McHenry	6	6%
Island Park Twp.	Ransom	6	6%
Grafton	Walsh	107	6%
Kane Twp.	Bottineau	3	6%
Columbus	Burke	7	6%
Mantador	Richland	2	6%

Community	County	Mobile Homes	Percentage of Housing Units that is Mobile Homes
Ross	Mountrail	5	5%
Newbury Twp.	Stutsman	2	5%
Mandan Twp.	Morton	44	5%
Flasher	Morton	9	5%
Rutland	Sargent	3	5%
New Rockford	Eddy	42	5%
Elma Twp.	Richland	1	5%
Freedom Twp.	Ward	4	5%
Fessenden	Wells	18	5%
West Logan Twp.	Logan	7	5%
Lidgerwood	Richland	22	5%
Sibley	Barnes	2	5%
Fairmount Twp.	Richland	2	5%
Spiritwood Lake	Stutsman	6	5%
Strasburg	Emmons	12	5%
Fingal	Barnes	3	5%
Niagara	Grand Forks	1	5%
Torning Twp.	Ward	1	5%
Buxton	Traill	7	5%
Valley Twp.	Barnes	12	5%
Oberon Twp.	Benson	2	5%
Morgan Twp.	Traill	4	5%
Newborg Twp.	Bottineau	1	5%
Berlin	LaMoure	1	5%
Bartlett Twp.	Ramsey	1	5%
McClusky Twp.	Sheridan	2	5%
Adams Twp.	Walsh	1	5%
Regent	Hettinger	7	5%
Towner	McHenry	13	5%
Greenfield Twp.	Griggs	3	5%
Lampton Twp.	Walsh	3	5%
Margaret Twp.	Ward	3	5%
Andrews Twp.	McLean	3	5%
Marmarth	Slope	4	5%
Willow Twp.	Griggs	4	5%
Mooreton	Richland	3	5%
Dickinson	Stark	528	5%
Rush River Twp.	Cass	2	4%
McHenry	Foster	2	4%
Beulah	Mercer	73	4%
Hoople	Walsh	5	4%

Community	County	Mobile Homes	Percentage of Housing Units that is Mobile Homes
Ellendale	Dickey	24	4%
Lignite	Burke	4	4%
Manvel	Grand Forks	7	4%
Bottineau	Bottineau	39	4%
Powers Lake Twp.	Mountrail	2	4%
Walle Twp.	Grand Forks	5	4%
Kenmare	Ward	28	4%
Tatman Twp.	Ward	45	4%
Buffalo	Cass	3	4%
Apple Creek Twp.	Burleigh	45	4%
Bowbells	Burke	9	4%
Regan	Burleigh	1	4%
Williston Twp.	Williams	23	4%
Lakota	Nelson	14	4%
Meadow Lake Twp.	Barnes	2	4%
Williston	Williams	571	4%
Wyndmere	Richland	10	4%
Page	Cass	5	4%
Reynolds	Grand Forks	2	4%
Burlington	Ward	19	4%
Pembina	Pembina	9	4%
Leeds Twp.	Benson	1	4%
Drake	McHenry	7	4%
Wolford	Pierce	1	4%
Cayuga	Sargent	1	4%
West Fargo	Cass	583	4%
Strege Twp.	McHenry	2	4%
Tower City	Cass	5	3%
Hay Creek Twp.	Burleigh	53	3%
Argusville	Cass	7	3%
Mott	Hettinger	15	3%
Hope	Steele	5	3%
Boyd Twp	Burleigh	1	3%
Garrison	McLean	24	3%
Harvey	Wells	33	3%
Portal	Burke	3	3%
Voltaire	McHenry	1	3%
Devillo Twp.	Richland	1	3%
Grand Forks	Grand Forks	880	3%
St. Mary Twp.	McLean	5	3%
Afton Twp.	Ward	11	3%

Community	County	Mobile Homes	Percentage of Housing Units that is Mobile Homes
Hatton	Traill	11	3%
Union Twp.	Grand Forks	2	3%
Tolna	Nelson	3	3%
Lone Tree Twp.	Golden Valley	2	3%
Marion	LaMoure	2	3%
Thompson	Grand Forks	12	3%
Litchville	Barnes	3	3%
Christine	Richland	2	3%
Lincoln-Fort Rice Twp.	Burleigh	34	3%
Burnt Creek-Riverview Twp.	Burleigh	27	3%
Adrian Twp.	LaMoure	2	3%
McVille	Nelson	6	3%
Buchanan	Stutsman	1	3%
Newman	Ward	1	3%
Edmore	Ramsey	6	3%
Linton	Emmons	16	3%
Hettinger	Adams	19	3%
Wishek	McIntosh	11	3%
Aneta	Nelson	3	3%
Mekinock Twp.	Grand Forks	16	2%
Donnybrook	Ward	1	2%
Turtle Lake	McLean	8	2%
Hunter	Cass	3	2%
Fort Berthold Twp.	Mercer	2	2%
Fort Ransom Twp.	Ransom	1	2%
Kindred	Cass	8	2%
Southwest McIntosh Twp.	McIntosh	3	2%
Wilton	McLean	6	2%
Petersburg	Nelson	2	2%
Rugby	Pierce	32	2%
Napoleon	Logan	10	2%
New England	Hettinger	7	2%
Drayton	Pembina	9	2%
Streeter Twp.	Stutsman	1	2%
Mayville	Traill	19	2%
New Salem	Morton	10	2%
Lake Williams Twp.	Kidder	1	2%
Lakeville Twp.	Grand Forks	2	2%
Cando	Towner	12	2%
Dunbar Twp.	Sargent	1	2%

Community	County	Mobile Homes	Percentage of Housing Units that is Mobile Homes
LaMoure	LaMoure	7	2%
Wahpeton	Richland	69	2%
Enderlin	Ransom	10	2%
Fargo	Cass	1118	2%
Ashley	McIntosh	9	2%
Carrington	Foster	18	2%
Lisbon	Ransom	16	2%
Esmond	Benson	2	2%
Binford	Griggs	2	2%
Surrey	Ward	10	2%
Edgeley	LaMoure	6	2%
Glen Ullin	Morton	7	2%
Underwood	McLean	6	2%
Kulm	LaMoure	4	2%
Harrison Twp.	Ward	12	2%
Westhope	Bottineau	3	2%
Bisbee	Towner	1	2%
Arthur	Cass	2	1%
Edinburg	Walsh	2	1%
Oakes	Dickey	12	1%
Sykeston	Wells	1	1%
Colfax	Richland	1	1%
Elgin	Grant	5	1%
Naughton Twp.	Burleigh	1	1%
Harwood	Cass	3	1%
Gibbs Twp.	Burleigh	11	1%
McClusky	Sheridan	2	1%
Zeeland	McIntosh	1	1%
Oxbow	Cass	1	1%
Portland	Traill	2	1%
Casselton	Cass	9	1%
Walhalla	Pembina	4	1%
Forman	Sargent	2	1%
Minnewaukan	Benson	1	1%
Cooperstown	Griggs	3	1%
Gackle	Logan	1	1%
Hillsboro	Traill	4	0%

Source: American Community Survey, 2022 5-Year Estimates

E. Risk Assessment Appendix

E.0 Plan Integration

Plan	State/Federal Agency	Where Integrated
North Dakota Vision Zero	North Dakota Department of Transportation	THIRA, Transportation Hazard Profile
North Dakota Moves Active Public Transportation and Transit Plan	North Dakota Department of Transportation	THIRA, Transportation Hazard Profile
North Dakota Emergency Communications Plan	North Dakota Department of Health and Human Services	THIRA
Continuity of Operations Plan	North Dakota Department of Emergency Services	THIRA
Long-Term Flood Solutions Plan	Red River Basin Commission	THIRA
ND Smart Restart	Office of the Governor	THIRA
North Dakota Freight and Rail Plan	North Dakota Department of Transportation	THIRA
Highway-Rail Grade Crossing State Action Plan	North Dakota Department of Transportation	THIRA
Heart Butte Reservoir Resource Management Plan	Bureau of Reclamation	THIRA
5 Year Strategic Plan	North Dakota Department of Water Resources	THIRA
Missouri River Basin Drought Early Warning System Strategic Action Plan	National Integrated Drought Information System	THIRA
North Dakota Statewide Assessment of Forest Resources and Forest Resource Strategy	NDSU-North Dakota Forest Service	THIRA
Strategic Intelligence Assessment and Data on Domestic Terrorism	Federal Bureau of Investigation	THIRA
Human Trafficking in the State of North Dakota	North Dakota Office of the Attorney General	THIRA
Seventh Biennial Report on Health Issues for the State North Dakota	UND School of Medicine and Health Sciences	THIRA

Long-Range Transportation Plan	North Dakota Department of Transportation	THIRA
Continuity of Operations Plan	North Dakota Department of Transportation	THIRA
Concepts of Operations	North Dakota State and Local Intelligence Center	THIRA
Report on Missouri River Stakeholder Meeting	Missouri River Joint Water Board	THIRA
North Dakota Department of Emergency Services Strategic Plan 2023-2027	North Dakota Department of Emergency Services	Alignment of goals and objectives
Local and Tribal Hazard Mitigation Plans	53 counties and 4 Tribal Nations	Analysis of risk assessments

E.1 Flood

E.1.1 Historic Occurrences

- **Spring 1826 Red River Flood:** This is the flood of record along the river in Canada, which has a longer recorded history in the basin, with an estimated 50 percent higher discharge than the second-highest flow in Winnipeg in 1997 (George, et.al, 2021). The 1812 Selkirk Settlement in Manitoba was an elongated fur-trading community along the river that was nearly destroyed in the flood, and the Hudson Bay trading post was damaged beyond repair, and relocated downstream (George, et. al, 2021). Canadian Pacific records of this data helped shape the Canadian standards along the Rid River, leading to a system that withstood the 1997 flood (George, et., al, 2021).
- **June 1861 Red River Flood:** Historical accounts from steamboat scouts indicate the valley filled from the mouth of the Sheyenne to Lake Winnipeg in a lake that remained for two weeks (Collins, 2004).
- **April 1897 Red River Flood:** After a particularly snowy winter, rail traffic was suspended on April 1 when the Red River eclipsed the tracks near Fargo, reaching its crest in the city on April 8 at 34.2 feet (Dakota Water Science Center, 2017). Most of the business and residential areas of Fargo dealt with Red River floodwaters (Dakota Water Science Center, 2017). The crest in Grand Forks two days later extended the Red River up to Third Street and flooded all tributaries, including seriously impacting Grafton (Dakota Water Science Center, 2017).
- **April 1950 Red River Flood:** A heavy snow season, frozen ground, enduring cold weather and heavy rains all contributed to an ice jam-filled flood season that was the worst in decades (USGS, 2023). More than 200 families had to be evacuated from the Grand Forks area; and flooding reduced the town of Pembina from 650 to 144 (USGS, 2023). One person died in Grand Forks, and 10 were injured across the state, from the floods that caused more than $30 million in damages in 1950 dollars (Water Resources Division, 1952).

- **April 1969 Statewide River Flooding:** A snowy winter and heavy spring rain in the Red River Valley contributed to near-record flooding across the state and region (Anderson and Schwob, 1970). Across six upper Midwestern states, damages exceeded $147 million in 1969 dollars (Anderson and Schwob, 1970). Much higher loss totals were avoided because conditions were known and protective measures were deployed (Anderson and Schwob, 1970). Nearly 12,000 residents were evacuated in Minot, where Souris River flooding caused $11 million in damages, partially due to dike failures (Anderson and Schwob, 1970). The Baldhill Dam had been releasing water ahead of the surge to protect Valley City (Anderson and Schwob, 1970). Nearly a third of Jamestown was inundated, despite the recent development of the Pipestem Dam (Anderson and Schwob, 1970).
- **June 1975 Red River Valley Flood:** Heavy precipitation on already saturated lands in the basin flooded tributaries eventually swelling the Red River. Damage estimates in North Dakota and Minnesota exceeded $250 million in 1975 dollars (Lindskhov, 1975).
- **April 1979 Red River Flood:** Downstream from Grand Forks, the Red River swelled to be as wide as 10 miles, Damages in North Dakota and Minnesota exceeded $114 million in 1979 dollars (Ericson, et. al,1980).
- **April 1989 Red River Flood:** Wahpeton and Fargo took the brunt of damages as flooding near the headwaters of the Red River began as its flooded tributaries converged after a series of snow melts and refreezes kept the ground from absorbing much runoff from a heavy rain (Ryan and Harkness, 1993) Estimated damages were $8.5 million in the two urbanized areas (Ryan and Harkness, 1993).
- **Summer 1993 Flash Floods:** Heavy summer rains lifted levels in Devils Lake nearly 5 feet (Breakey, 2018). Areas of the state had four times the normal amount of precipitation (Larson, 1995).
- **March 1994 Missouri River Flood:** Heavy snowfalls in Montana and North Dakota followed by a rapid warm-up led to snowmelt and ice jams in the Yellowstone and Missouri Rivers causing about $5 million in damages in Williston and western North Dakota (USGS, 2005).
- **April 1996 Red River Flood:** A heat wave accelerated snowmelt throughout the Red River Valley, causing moderate flooding in Fargo and significant flooding in Grand Forks, Drayton, and Pembina (NOAA NWS Grand Forks, 2023) One motorist died when ignoring road closure signs, and the National Guard was called in to assist (Cass County Multijurisdictional Multi-Hazard Mitigation Plan, 2019).
- **April 1997 Red River Flood:** A wet fall and early freeze with abnormally heavy snow and an April blizzard after another high-flow year left saturated soils and heavy snowmelt to drain from a system still full from the previous year's floods (Ryberg, et. al, 2007). Snow in the states was 200 percent of normal (Dakota Water Science Center, 2017). Grand Forks was devastated by the flood, with the Red River cresting at a record 54.35 feet (28 feet is flood stage), exceeding any local levees as the level rose up to 2 feet a day (FEMA, 2022). Ninety percent of the city's population was evacuated, and 83 percent of homes were inundated (FEMA, 2022). Water infrastructure was impacted, keeping the city without drinking water for 23 days (FEMA, 2022). While Grand Forks' downtown was inundated, a fire broke out, and floodwaters limited response, leading to the loss of 60 apartments and 11 historic buildings (FEMA, 2022). More than 20,000 volunteers assisted with rebuilding; and 60,000 tons of debris was disposed of in a landfill from the event (FEMA, 2022). Total damages were estimated at $4 billion (NOAA NWS,

1998). In Fargo, dike failure led to 30 homes and a high school flooding, and interstates were flooded throughout Cass County, with the leveed community of Harwood isolated inside its levees, only accessible by boat (Cass County Multijurisdictional Multi-Hazard Mitigation Plan, 2019).

- **June 2000 Flash Floods:** Summer storms dropped 17 inches of rain in northern North Dakota, causing $500,000 in damages to Turtle River State Park (Grand Forks Herald, 2009). All rivers in the area swelled to try to pass the precipitation. Flash floods in Casselton damaged 40 percent of the homes (Cass County Multijurisdictional Multi-Hazard Mitigation Plan, 2019). The Fargo dome was damaged and up to 50 percent of the streets of Fargo were inundated during one rain event (Cass County Multijurisdictional Multi-Hazard Mitigation Plan, 2019). Nearly every building on the NDSU campus along with phone and internet services on campus were impacted by the heavy rains (Cass County Multijurisdictional Multi-Hazard Mitigation Plan, 2019). Nearly $40 million in Public Assistance was obligated in response (FEMA, 2022).
- **April 2001 Red River Floods:** Above-average soil moisture, rapid snowmelt and heavy storms caused the Red River and its tributaries to swell (Macek-Rowland, 2001). The U.S. Army Corps of Engineers constructed levees at Wahpeton, Fargo and Grand Forks that successfully protected the cities from serious flooding (Dakota Water Science Center, 2017). Cass County damages alone were $2.8 million (Cass County Multijurisdictional Multi-Hazard Mitigation Plan, 2019).
- **Summer 2001 Devils Lake Closed Basin Flood:** Beginning in May, Devils Lake's levels began to rise quickly, reaching an elevation of 1,447.5 feet on May 10 and growing at 15 cubic feet per second. The main basin exceeded its overflow point of 1,448.1 feet by May, draining into Stump Lake and inundating an even greater acreage of productive agricultural land (Landenberger, 2001).
- **June 2002 Flash Floods:** A series of severe storms swelled the Red River and its tributaries and caused overland flooding throughout northeastern North Dakota, when it fell on hardened drought-starved soil (Wiche, et.al, 2002).
- **April 2004 Red River Valley Floods:** Emerado was evacuated and the water system was incapacitated by floodwaters (Associated Press, 2004). Minto was partially cutoff from services, while 20 houses flooded (Associated Press, 2004). Grafton had 60 homes inundated (Associated Press, 2004) when heavy rains fell on snow-covered frozen ground (Associated Press, 2004).
- **April 2006 Red River Flood:** Rising above flood stage near Fargo at the end of March and staying there for three weeks, the 2006 floods accounted for the sixth-highest gage reading ever in Fargo (Cass County Multijurisdictional Multi-Hazard Mitigation Plan, 2019). Overland and tributary flooding was damaging as well. More than 40 roads were closed in Cass County (Cass County Multijurisdictional Multi-Hazard Mitigation Plan, 2019). One man drowned, and $20 million in damages were caused (Cass County Multijurisdictional Multi-Hazard Mitigation Plan, 2019). A dike was built to protect a Richland County retirement center (Wahpeton Daily News, 2006).
- **Spring 2009 Statewide River Flood, Devils Lake Closed Basin Flooding, and Flash Floods:** Snow depth coming out of the winter was 500 percent greater than usual, powering a flood season that endured from March until June (NDDES, 2009). After a record snowfall or near-record snowfall in much of the state that was followed by record rainfalls, nearly every stream and basin in the state was affected (Macek-Rowland, 2010). Throughout the state 48 peak stage records were set (Macek-Rowland and Gross, 2010). Ice jams made flood elevations worse in

the Missouri, where nearly 1,700 residents had to be evacuated from southwest Bismarck (Macek-Rowland and Gross, 2010). Flows of western rivers exceeded 1997 stages and discharges (Macek-Rowland and Gross, 2010). Near Jamestown the emergency spillway was deployed at the Jamestown Dam as 1.4 million sandbags were deployed in the city to accompany 5.5 miles of temporary levees (Macek-Rowland and Gross, 2010). Along the Sheyenne, flooding limited utilities in much of Valley City, prompting evacuations (Macek-Rowland and Gross, 2010). Devils Lake rose to 28.1 feet higher than its 1993 levels, and the city of Devils Lake required temporary levee construction (Macek-Rowland and Gross, 2010). The state Emergency Operations Center (EOC) fielded 600 requests for assistance and activated its mutual aid agreements; 800 federal workers also responded (NDDES, 2009).

- **March 2010 Red River Floods:** Fargo flooded in flood prone areas as at least a million sand bags were deployed to protect much of the city from a crest about a meter below the previous year's mark (Welch, et. al, 2010). The National Guard was deployed to combat early snowmelt in the southern part of the basin backed up by ice and snow that had yet to flow downstream in the north-flowing river Welch, et.al, 2010). City damages alone exceeded $7.5 million (Cass County Multijurisdictional Multi-Hazard Mitigation Plan, 2019).
- **Spring 2011 Statewide River and Devils Lake Floods:** Abnormally wet weather starting early in the spring melted the snow and kept river gages high across the state. It broke 21 records and cost more than $1.4 billion (North Dakota Department of Emergency Services, 2011). The city of Belcourt was first to flood in mid-February (NDDES, 2011). The Souris/Mouse River began flooding next, and stayed flooded until July (NDDES, 2011). State and federal resources were deployed to Minot, yet 4,100 structures were still inundated (NDDES, 2011). Next to flood in June was the Missouri Basin when snowmelt from Montana required record releases from the Garrison Dam (NDDES, 2011) After initial success fighting the threat of the river, ground saturation caused damage to properties in Bismarck (NDDES, 2011). The Red River at Fargo spent 150 days above flood stage beginning in March (Cass County Multijurisdictional Multi-Hazard Mitigation Plan, 2019). Devils Lake netted a 2-foot elevation gain over the year, claiming 31,000 acres (NDDES, 2011).
- **May 2013 Flash Floods:** Far northeast North Dakota faced a late snowmelt of record snowfall with significant rain events. Dams experienced damage while damages were avoided to downstream communities (North Dakota State Water Commission, 2013). Due to the threat to Renwick Dam, the residents of Cavalier were asked to evacuate (Fargo Forum, 2013). Minto and Crystal evacuated from overland and tributary flooding (Dickinson Press, 2013). Eight households were evacuated from a flooded mobile home park in Rolette County (Grand Forks Herald, 2013).
- **August 2014 Flash Floods:** Western North Dakota had record-setting 10.5 inches of hard rains that damaged road and bridges and flooded the Knife River and other usually small streams. At least 15 homes were damaged, and two were injured in a weather-affected accident (Insurance Journal, 2014).
- **Spring 2017 Northern North Dakota Riverine Flooding:** Above-normal snowfall and a quick melt created overland flooding and damage to roads in north-central and northeast North Dakota causing about $3.4 million in damage (NDDES, 2017).

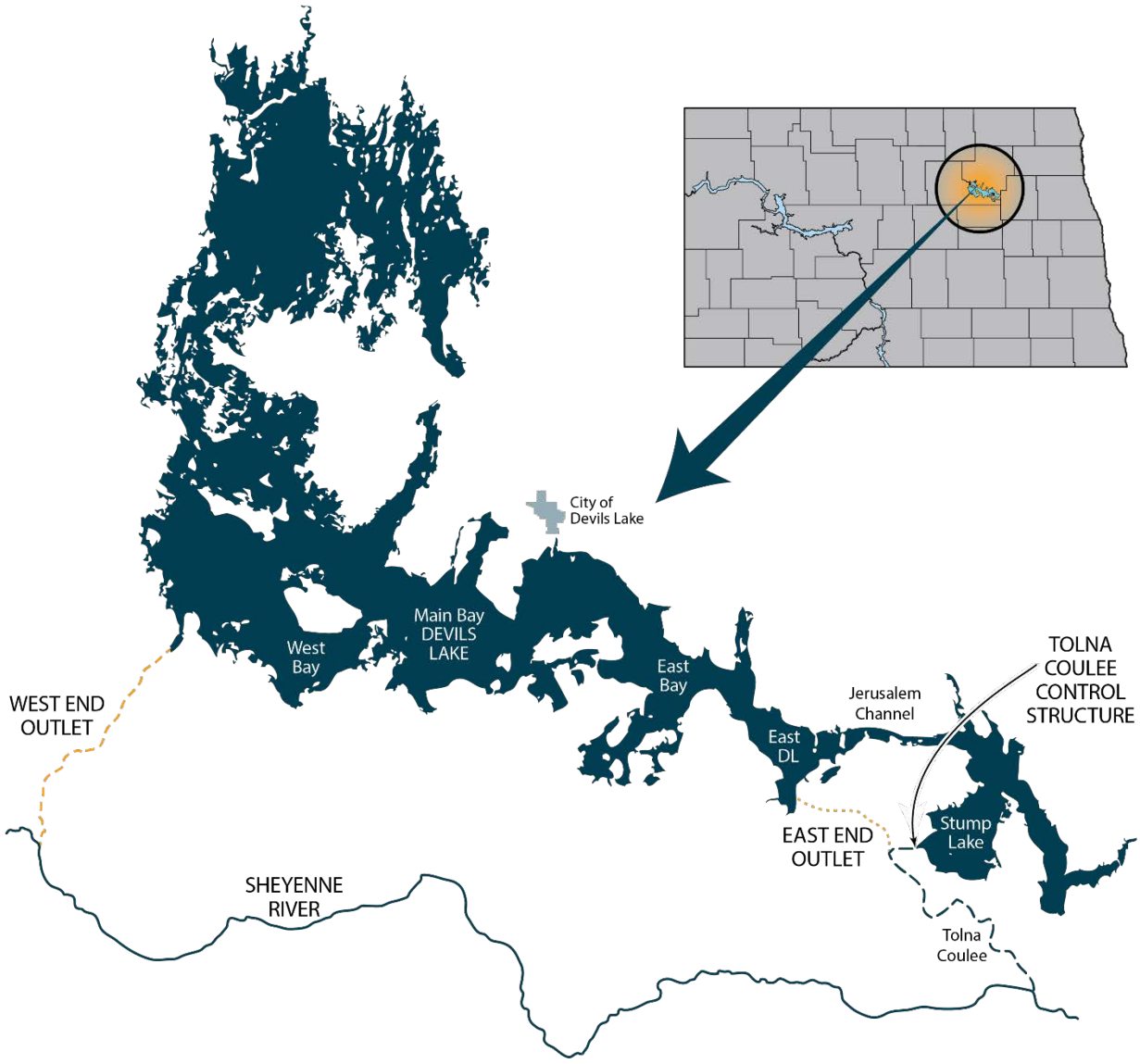
E.1.2 Declared Disasters

Year	Declaration	Location	Casualties	Damages
1965	DR 195	Statewide	--	--
1966	DR 216	Statewide	--	--
1966	DR 220	Statewide	--	--
1969	DR 256	Statewide	None	$27,000,000
1970	DR 287	Statewide	--	--
1972	DR 335	Statewide	--	--
1974	DR 434	Statewide	--	--
1975	DR 469	Statewide	--	$1,000,000,000
1975	DR 475	Statewide	--	--
1976	EM 3012	Statewide	--	--
1976	DR 501	Statewide	--	--
1978	DR 554	Statewide	--	--
1979	DR 581	Statewide	--	$64,800,000
1982	DR 658	Statewide	--	--
March-April 1989	DR 825	Eastern North Dakota	--	$2,719,000
June-September 1993	DR 1001	Central and Eastern North Dakota	2 fatalities	$600,000,000
February-May 1997	DR 1174	Statewide	7 fatalities, 2 injuries	$211,000,000
March 2-July 18, 1998	DR 1220	Eastern North Dakota	None	$18,054,727
March 1, 1999- July 19, 1999	DR 1279	Central and Eastern North Dakota	None	$124,391,622
March 1, 2001-August 9, 2001	DR 1376	Statewide	--	$23,460,073
February 26, 2010-April 30, 2010	DR 1907	Central and Eastern North Dakota	--	$19,679,317
February 14, 2011-July 20, 2011	DR 1981	Statewide	--	$43,547,540
April 22, 2013-May 16, 2013	DR 4118	Eastern North Dakota	--	$7,182,175
May 25, 2013-June 1, 2013	DR 4123	Standing Rock Sioux Tribe	--	$239,920
June 25, 2014-July 1, 2014	DR 4190	10 counties across the state	--	$2,396,873
March 23, 2017-April 29, 2017	DR 4323	Northern North Dakota	--	$5,412,959
March 21, 2019-April 28, 2019	DR 4444	Statewide	--	$8,253,412

Year	Declaration	Location	Casualties	Damages
October 9, 2019-October 26, 2019	DR 4475	Statewide	--	$12,807,582
April 1, 2020-April 25, 2020	DR 4553	Central and Eastern North Dakota	--	$6,791,907
April 10, 2023-May 6, 2023	DR 4717	Statewide	--	$176,758.66

Source: FEMA, 2023

E.1.3 Basin Descriptions



DEVILS LAKE OUTLET PROJECTS

The Devils Lake Basin in northeast North Dakota is a subbasin of the Red River of the North Basin. Devils Lake and Stump Lake are the two primary closed basin lakes at the southern edge of the basin. As closed basin lakes, they receive and store runoff from their respective drainage basins and their water levels can fluctuate from dry to overflowing in response to changing climatic conditions.

There is geologic evidence that the lakes have overflowed to the Sheyenne River and dried up completely on several occasions over the past 10,000 years. More recent history also shows that dramatic swings in lake elevation are possible. In 1940, Devils Lake was nearly

dry at an elevation of 1401 feet (NGVD 29), and in June 2011, the lake reached a modern-day record high elevation of 1454.3 feet. This fluctuation of over 53 feet of lake elevation is a change of over 300 square miles of lake area.

Since 1993, the Devils Lake Basin has experienced a wet cycle which has wreaked havoc on basin residents by threatening communities, flooding tens of thousands of acres of agricultural land, and forcing the abandonment of homes, roads, and other facilities. These conditions have caused the State of North Dakota to take an active role in flood prevention and mitigation. Specifically, the State has implemented three broad strategies to attempt to prevent future damaging flooding in the Devils Lake Basin. These strategies include construction and operation of outlets to the Sheyenne River, basin water management, and infrastructure protection.

James River

The James River originates in central North Dakota between the cities of Harvey and Fessenden and generally flows south-southeast for approximately 710 miles until it empties into the Missouri River near Yankton, South Dakota. The James River has one of the flattest slopes of any river in North America, and its drainage basin covers approximately 22,000 square miles.

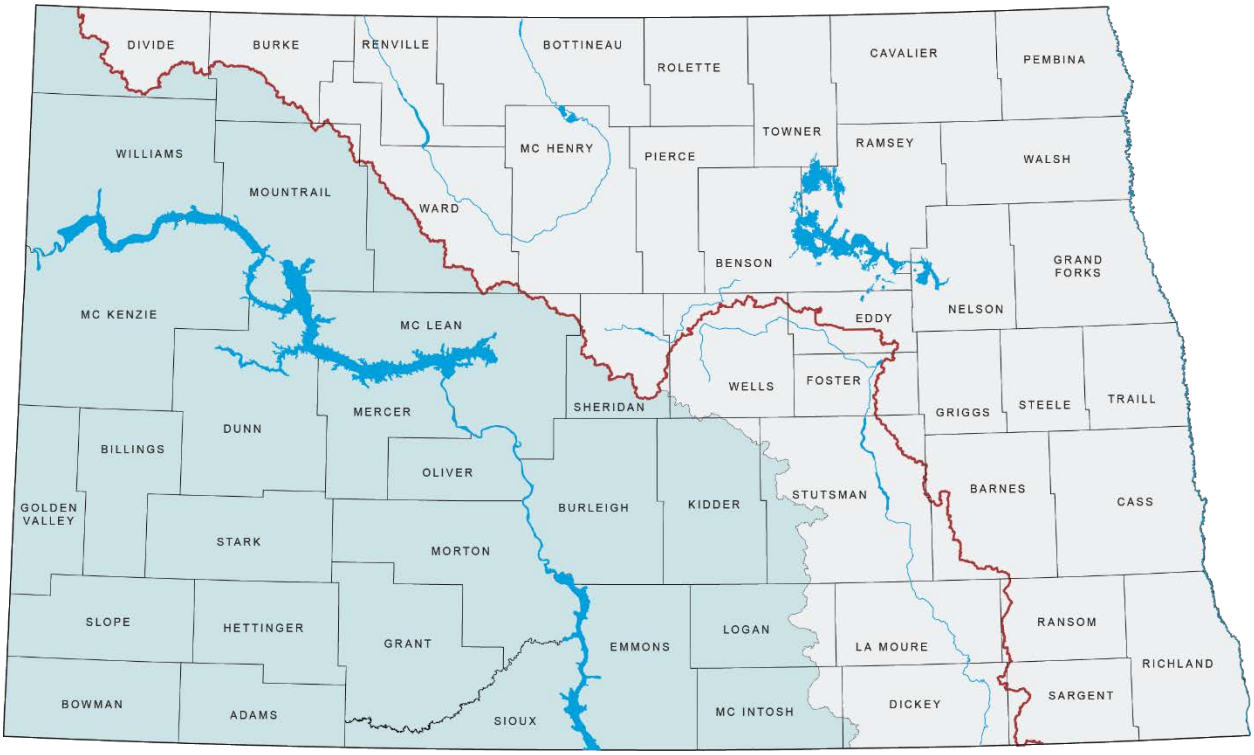
The Jamestown and Pipestem reservoirs are located immediately north of the city of Jamestown on the James River and Pipestem Creek, respectively. Jamestown Dam is owned by the US Bureau of Reclamation and is regulated by the US Army Corps of

Engineers Omaha District when the reservoir is in flood control zone. Construction of the Jamestown Dam was completed in September 1953, and the reservoir is a popular tourist and recreation site year-round.

Pipestem Dam is owned and regulated by the US Army Corps of Engineers Omaha District. Construction of Pipestem Dam was completed in 1973 and the reservoir also serves as a popular camping and tourism destination.

The James River in North Dakota flows through or near the cities of New Rockford, Jamestown, Ypsilanti, Montpelier, Dickey, LaMoure, Oakes, and Ludden. Since the completion of the Jamestown and Pipestem Dams, the James River has experienced only mild flooding in comparison to many of North Dakota's other river basins.

Missouri River



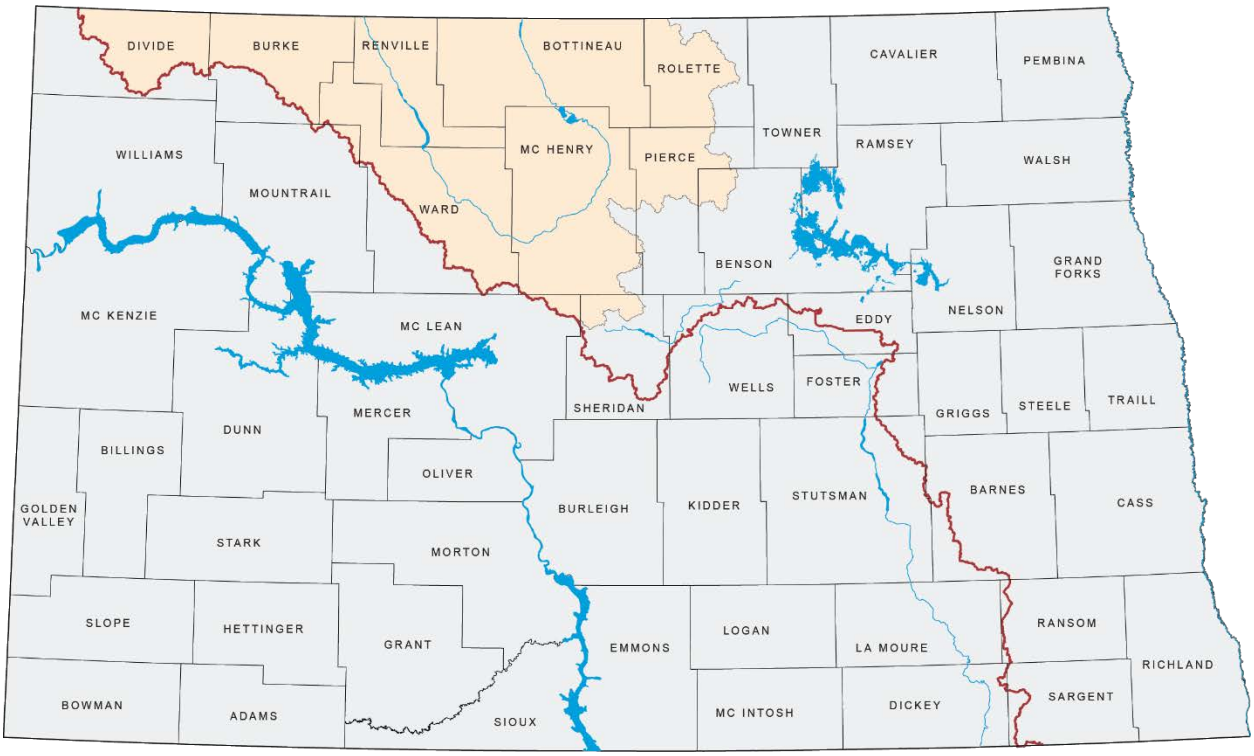
With a basin that covers all or portions of ten states and two Canadian provinces, the Missouri River stretches over 2,300 miles from central Montana to its confluence with the Mississippi River, making it the longest river in the United States.

Six dams and reservoir projects make up the Missouri River reservoir system. Each of the projects were constructed by the federal government and are operated and maintained by the Corps of Engineers for the purposes of flood control, water supply, recreation, irrigation, hydropower, water quality, fish and wildlife, and navigation. Harnessing the Missouri River has brought substantial economic, environmental, and social benefits to North Dakota and the other states.

For decades, the State of North Dakota has worked diligently to protect and develop its interests in the Missouri River, while recognizing that our state makes up only a portion of the basin. North Dakota has supported cooperative basin-wide efforts that strive to balance varied interests. At the same time, North Dakota will continue to affirm that the state will utilize the Missouri River for beneficial use by its citizens.

The Missouri River is the state's most valuable and readily available water source, and is needed for a broad spectrum of beneficial uses, such as irrigation, drinking water supplies, and industry.

Mouse/Souris River Basin

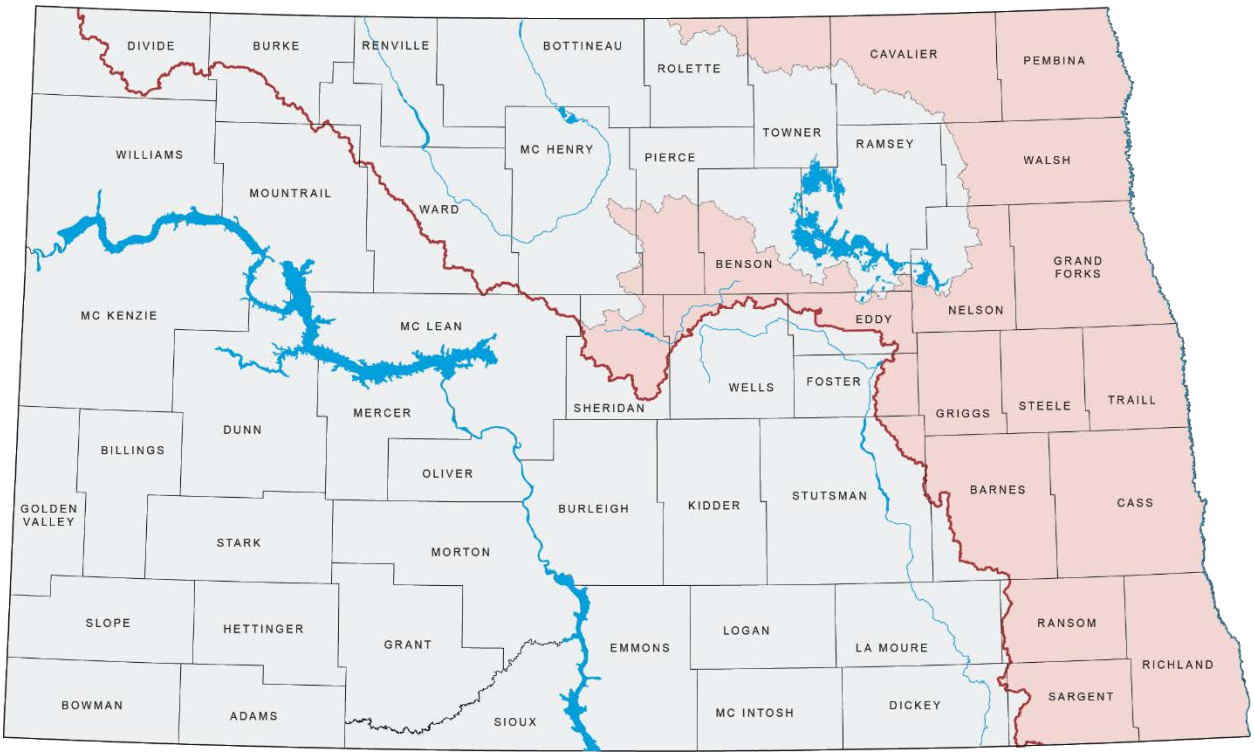


The Mouse River, or the Souris River as it is known in Canada, originates in southeast Saskatchewan near the city of Wayburn. From there, the Mouse River meanders 357 miles through North Dakota, entering near Sherwood, then flows through Minot, to its southernmost point at Velva, North Dakota. From Velva, the Mouse turns back to the north and into Manitoba.

The topography in the basin is varied to include hilly terrain in the southwest, flat glacial lake plains in the east, and forested hills of the Turtle Mountains in the northeast.

The Mouse River basin drains nearly 23,600 square miles and has a long history of flooding. Some of the biggest floods on record happened in 1969, 1976, and 2011. The Mouse River flood of 2011 was the biggest flood event in recorded history by far.

Red River



From its origin at the confluence of the Ottertail and Bois de Sioux Rivers at Wahpeton, North Dakota, and Breckenridge, Minnesota, the Red River winds northerly almost 400 river miles, forming the boundary between North Dakota and Minnesota. From the Canadian border, the Red River flows about 155 river miles north to Lake Winnipeg in Manitoba. The valley through which the river flows is the bed of glacial Lake Agassiz. The lakebed is very flat and accounts for the meandering course and low gradient of the river.

The headwaters of most of the eight major tributaries in North Dakota begin in the drift prairie in the western part of the basin where valleys are narrow and steep-sided. As the tributaries enter the lowlands of the lakebed, the river slopes become very flat, with poorly defined watershed boundaries. The largest reservoir in the Red River Basin is Lake Ashtabula. This flood control and water supply dam is located on the main channel of the Sheyenne River and has 200,000 acre-feet of maximum storage. The Red River Basin has 70% of its area devoted to cropland – the highest percentage among the five major basins.

Source: North Dakota Department of Water Resources, 2023

E.1.4 Scour Critical Rating for Bridges by County

County	State	County	Urban	Total
Adams	2	2		4
Barnes		2		2
Benson				0
Billings	1			1
Bottineau		1		1
Bowman		1		1
Burke	1			1
Burleigh		2		2
Cass		2		2
Cavalier				0
Dickey		1		1
Divide		1		1
Dunn				0
Eddy		1		1
Emmons	2	2		4
Foster				0
Golden Valley		2		2
Grand Forks				0
Grant	1	6		7
Griggs				0
Hettinger	2	7		9
Kidder				0
La Moure		2		2
Logan		1		1
McHenry		2		2
McIntosh				0
McKenzie				0
McLean		2		2
Mercer		3		3
Morton		7		7
Mountrail				0
Nelson	1			1
Oliver		1		1
Pembina				0
Pierce				0
Ramsey		1		1
Ransom				0
Renville				0
Richland	1	1		2
Rolette				0

County	State	County	Urban	Total
Sargent				0
Sheridan				0
Sioux				0
Slope				0
Stark	1	1		2
Steele		1		1
Stutsman		1		1
Towner				0
Traill		1		1
Walsh		1		1
Ward		2	2	4
Wells		1		1
Williams		1	1	2
Total	**12**	**59**	**3**	**74**

Source: North Dakota Department of Transportation, 2023

E.1.5 National Flood Insurance Policy Loss Statistics

County	Policies	Coverage	Claims Paid Since 1978	Total Paid Since 1978
Adams	0	$0	0	$0
Barnes	110	$125,741	393	$2,686,849
Benson	12	$4,038,000	576	$13,477,647
Billings	7	$2,173,000	13	$99,601
Bottineau	5	$708,000	2	$0
Bowman	2	$537,000	13	$15,701
Burke	1	$110,000	1	$4,219
Burleigh	598	$176,433,000	684	$15,255,882
Cass	2277	$1,419,140	3379	$25,132,141
Cavalier	1	$51,000	4	$3,433
Dickey	1	$45,000	6	$20,331
Dunn	1	$249,000	7	$48,098
Eddy	2	$133,000	6	$19,677
Emmons	7	$1,152,000	83	$1,140,952
Foster	2	$654,000	10	$110,338
Golden Valley	0	$0	2	$0
Grand Forks	458	$138,890,000	3120	$75,888,332
Grant	0	$0	8	$50,991
Griggs	3	$1,004,000	6	$26,160
Hettinger	2	$268,000	106	$320,010
LaMoure	10	$1,590,000	10	$78,230
Logan	0	$0	1	$252,920
McHenry	37	$12,476,000	66	$671,970
McIntosh	0	$0	2	$7,285
McKenzie	12	$3,619,000	2	$0
McLean	2	$528,000	9	$66,662
Mercer	56	$8,396,000	92	$923,574
Morton	165	$49,312,000	231	$2,823,981
Nelson	0	$0	41	$872,085
Oliver	4	$503,000	4	$4,703
Pembina	84	$15,333,000	550	$3,123,691
Pierce	1	$16,000	6	$45,786
Ramsey	50	$20,782,000	1063	$37,304,596
Ransom	23	$5,027,000	144	$690,612
Renville	5	$598,000	57	$156,632
Richland	46	$11,583,000	219	$2,238,211
Rolette	2	$850,000	3	$23,024
Sargent	0	$0	7	$89,160
Sioux	2	$245,000	5	$871

County	Policies	Coverage	Claims Paid Since 1978	Total Paid Since 1978
Slope	0	$0	1	$0
Stark	35	$7,934,000	26	$78,811
Stutsman	56	$14,145,000	121	$672,682
Towner	2	$524,000	28	$340,500
Traill	33	$7,366,000	155	$1,611,395
Walsh	120	$17,597,000	1196	$4,743,119
Ward	1422	$450,855,000	1080	$69,216,538
Williams	29	$9,263,000	19	$247,997

Source: FEMA, 2023

E.1.6 Events, Deaths, and Damages from Riverine and Flash Flooding

County	Riverine					Flash				
	Events	Deaths	Injuries	Prop Dam.	Crop Dam.	Events	Deaths	Injuries	Prop Dam	Crop Dam
Adams	3	0	0	$179,000	$25,000	1	0	0	$ 30,000	$ -
Barnes	15	0	3	$1,030,000	$2,970,000	16	0	0	$ 485,000	$ 170,000
Benson	45	0	0	$62,070,000	$2,575,000	21	0	0	$ 253,000	$ 10,030,000
Billings	3	0	0	$100,000	$0	3	0	0	$ 40,000	$ -
Bottineau	9	0	0	$1,297,000	$100,000	7	0	0	$ 759,000	$ -
Bowman	3	0	0	$437,000	$150,000	1	0	0	$ 50,000	$ -
Burke	2	0	0	$80,000	$25,000	1	0	0	$ 75,000	$ -
Burleigh	13	0	0	$21,288,000	$100,000	19	0	0	$ 1,995,000	$ 125,000
Cass	36	1	0	$270,206,000	$20,125,000	44	0	0	$ 106,388,500	$ 250,000
Cavalier	17	0	0	$1,292,000	$250,000	6	0	0	$ 27,500	$ 280,000
Dickey	5	0	0	$929,000	$0	8	0	0	$ 1,445,000	$ 45,000
Divide	2	0	0	$298,000	$100,000					
Dunn	9	0	0	$2,360,000	$400,000	4	0	0	$ 20,000	$ 25,000
Eddy	10	0	0	$15,000	$0	16	0	0	$ 202,000	$ 25,000
Emmons	3	0	0	$1,048,000	$0	6	0	0	$ 695,000	$ -
Foster	3	0	0	$615,000	$0	4	0	0	$ 1,120,000	$ -
Golden Valley	2	0	0	$140,000	$0	4	0	0	$ -	$ -
Grand Forks	25	1	0	$3,007,482,000	$31,600,000	51	2	0	$ 18,137,000	$ 10,985,000
Grant	5	0	0	$467,000	$0	5	0	0	$ 275,000	$ -
Griggs	13	0	0	$270,000	$20,000	7	0	0	$ 35,000	$ 100,000
Hettinger	5	2	0	$1,128,000	$0	4	0	0	$ 45,000	$ -
Kidder	3	0	0	$1,345,000	$0	5	0	0	$ 470,000	$ 35,000
La Moure	4	2	0	$2,593,000	$0	8	0	0	$ 1,156,000	$ 35,000
Logan	3	0	0	$171,000	$0	3	0	0	$ 269,000	$ 100,000
McHenry	10	0	0	$5,467,000	$0	7	0	0	$ 183,000	$ -
McIntosh	3	0	0	$127,000	$0	1	0	0	$ 225,000	$ -

County	Riverine					Flash				
	Events	Deaths	Injuries	Prop Dam.	Crop Dam.	Events	Deaths	Injuries	Prop Dam	Crop Dam
McKenzie	8	0	0	$5,444,000	$250,000					
McLean	6	0	0	$5,555,000	$0	6	0	0	$ 435,000	$ -
Mercer	8	0	1	$5,078,000	$500,000	4	0	0	$ 93,000	$ 15,000
Morton	13	0	0	$11,818,000	$145,000	8	0	0	$ 2,000,000	$ -
Mountrail	9	0	0	$816,000	$100,000	7	0	0	$ 215,000	$ -
Nelson	45	0	0	$9,165,000	$30,000	15	0	0	$ 2,313,500	$ 22,207,000
Oliver	6	0	0	$687,000	$0	5	0	0	$ 55,000	$ -
Pembina	45	0	0	$1,966,000	$3,265,000	13	0	0	$ 791,000	$ 10,350,000
Pierce	3	0	0	$296,000	$0	1	0	0	$ -	$ -
Ramsey	46	0	1	$117,015,000	$2,100,000	16	0	0	$ 300,500	$ 10,200,000
Ransom	26	0	0	$1,092,000	$0	18	1	0	$ 26,000	$ 210,000
Renville	4	0	0	$5,096,000	$50,000	7	0	0	$ 1,165,000	$ -
Richland	37	0	0	$79,603,000	$100,000	44	0	0	$ 277,500	$ 765,000
Rolette	4	1	0	$470,000	$0	9	0	0	$ 213,000	$ -
Sargent	23	0	0	$560,000	$0	22	0	0	$ 35,000	$ 150,000
Sheridan	1	0	0	$0	$0	1	0	0	$ 200,000	$ 250,000
Sioux	6	0	0	$730,000	$0	8	2	2	$ 1,141,000	$ 50,000
Slope	1	0	0	$50,000	$50,000					
Stark	3	0	0	$580,000	$175,000	4	0	0	$ 565,000	$ -
Steele	17	0	0	$400,000	$1,140,000	12	0	0	$ 310,000	$ 10,150,000
Stutsman	5	0	0	$1,105,000	$250,000	17	0	0	$ 1,190,000	$ 20,000
Towner	14	0	0	$0	$0	8	0	0	$ 20,000	$ 110,000
Traill	22	0	0	$11,242,000	$1,000,000	14	0	0	$ 310,500	$ 10,050,000
Walsh	39	1	0	$17,140,000	$265,000	17	0	0	$ 151,000	$ 405,000
Ward	10	0	0	$101,821,000	$250,000	15	0	0	$ 6,514,000	$ -
Wells	6	0	0	$2,550,000	$0	11	0	0	$ 1,029,000	$ 710,000
Williams	8	0	0	$675,000	$55,000	4	0	0	$ 1,365,000	$ -

Source: NCEI, 2023

E.1.7 Damages to State Parks from Floods

ND State Parks sustained significant trail damage at Pembina Gorge State Recreation Area, Fort Ransom State Park, and Turtle River State Park from the 2022 flood event. Bank erosion is a continuing issue along the Sheyenne at Fort Ransom State Park for which the agency is working on a PA Mitigation Grant for a bank stabilization project. (Sean Johnson, ND Parks and R

Facilities Repeatedly Damaged by an Emergency Event Report

NHS, State, and County Sites

Evaluations Conducted October 2020

Conducted by: Maintenance
Division Local Government
Division

Facilities Repeatedly Damaged by Emergency Events Summary

In accordance with 23 CFR 667, NDDOT conducted statewide evaluations where applicable on facilities that were repeatedly damaged on two or more occasions. NDDOT took reasonable actions to determine the locations and corrective actions that occurred at each location based on the data we had. We also received data from the ND FHWA Division office in determining past authorization of Emergency Relief projects within the state.

23 CFR 667 requires states to evaluate these locations back to January 1, 1997. Data prior to 2009 related to the exact damage and location is very limited. NDDOT used an existing database and information provided by the ND FHWA Division office in compiling this information.

NDDOT determined there has been 19 locations were facilities not on the NHS that were repeatedly damaged by two or more emergency events. NDDOT mapped these locations based on the data we had and grouped sites in close proximity to each other. Locations that were fairly close or overlapped based on the permanent repairs that were completed, were considered “a location or group” where an evaluation was considered necessary.

Based on the evaluations conducted related to the NHS sites, NDDOT has either mitigated or minimized the chance of damage reoccurring again at these locations. NDDOT has prepared a report of these locations.

Group Site Name: I-29

Highway: I-29

Location (RP, LAT/LON, or SEC/TWP/R): I-29, Grand Forks & Walsh Counties, RP 158 to RP 172

Owner: State

NHS (yes/no): Yes

Event Years: 1997, 2009, 2011

Description of damage:

1997: High water damage right of way fence along I-29.

2009: Due to high water and sheet ice flow, numerous right of way fence was destroyed. Some ditch blocks and median blocks were damaged. There were large debris deposits within I-29 right of way.

2011: Debris from the recent flood were deposited within the I-29 right of way. The debris consists of timber, branches, grass & field organic materials, and other man-made materials.

Completed Permanent Repairs:

1997: SER-6-029(038)161: Repair and replace right of way fence.

2009: SER-6-029(090)161: Repair and replace right of way fence. Clear debris from clear zones and right of way. Restoration of ditch blocks and median blocks to maintain positive drainage within the right of way.

2011: SER-6-029(114)158: For safety of mowing and the traveling public, the debris shall be removed from within the limits of the right-of-way and any easements. The debris removal will include materials caught by the right-of-way fencing that runs along Interstate.

Evaluation:

Because of the geography of this area, much of the farmland adjacent to I-29 is inundated with flood water when the Red River floods. Debris and ice sheets become tangled in the right of way fence and deposited within the I-29 right of way. Damage to the roadway is generally considered minor, but fencing repairs and debris clean up would be required with major flooding events. I-29 is located within a floodway and replacing fencing is cost effective compared to raising this corridor. As this corridor is in a floodway, raising the corridor would increase localized flooding resulting in additional damage to other facilities or communities adjacent to this corridor.

Group Site Name: ND 13

Highway: ND 13

Location (RP, LAT/LON, or SEC/TWP/R): ND 13, west of Lehr, McIntosh County, RP 240 to RP 242.5

Owner: State

NHS (yes/no): Yes

Event Years: 1999, 2010

Description of damage:

1999: Erosion due to high water and wave action.

2010: During planned reconstruction project, substantial rise in water elevation overtopped the roadway in the closed basin.

Completed Permanent Repairs:

1999: SER-SNH-2-013(016)241: Riprap placed to prevent further erosion from wave action.

1999: SER-SNH-2-013(017)242: Riprap placed to prevent further erosion from wave action.

2010: SER-NH-2-013(027)233: A grade raise was completed above 25-year event in a closed drainage basin and flatten inslopes to prevent erosion.

2010: SER-2-013(041)241: Hot bituminous surfacing for the temporary gravel grade raise project SER-2-013(040)241 that was constructed earlier in the year.

Evaluation:

The permanent grade raise for the 2010 event has maintained safe travelling conditions and protected the roadway from further damage. The permanent grade raise increased the roadway profile above the 25-year event in this closed basin. The hydraulic analysis from 2010 did not specify the natural outlet elevation of the closed basin at this site. The site will continue to be monitored for any impacts to the roadway as the water level fluctuates over time.

Group Site Name: ND 11 - 1

Highway: ND 11

Location (RP, LAT/LON, or SEC/TWP/R): ND 11, Emmons County, west of Hague, RP 2

Owner: State

NHS (yes/no): No

Event Years: 1997, 2010

Description of damage:

1997: High water threatened to inundate the roadway and caused erosion to the inslope.

2010: Unforeseen high water and high winds created wave action that washed away riprap and eroded the north inslope into the clear zone threatening the roadway.

Completed Permanent Repairs:

1997: SER-1-011(004)002: Install and relay erosion pads.

2010: SER-1-011(007)002: The north inslope was reshaped to the original cross-section with borrow material. Fabric and riprap were replaced to protect the inslope.

Evaluation:

The past events at this site have caused damage to the inslope of the roadway. The repairs completed at this site have restored the inslope and provided appropriate erosion protection from further damage by restoring the erosion pads and riprap. No more damage is foreseen at this site with the current erosion control measures in place.

Group Site Name: ND 11 - 2

Highway: ND 11

Location (RP, LAT/LON, or SEC/TWP/R): ND 11, McIntosh County, east of Ashley, RP 41

Owner: State

NHS (yes/no): No

Event Years: 1997, 2011

Description of damage:

1997: Roadway inundated by water in a closed basin.

2011: Roadway inundated by water in a closed basin.

Completed Permanent Repairs:

1997: SER-2-011(014)041: Permanent grade raise, culvert extension, aggregate base, hot bituminous pavement, and riprap.

2011: SER-2-011(029)041: A permanent grade raise, 5' plus applicable freeboard, was constructed to keep the driving surface out of the water and maintain a safe travel condition. The centerline elevation for the top of the pavement is 1936'.

Evaluation:

The permanent grade raise for the 2011 event has maintained safe travelling conditions and protected the roadway from further damage. Currently the roadway is over 10' below the natural outlet elevation of 1948' for the closed basin at this site. Prior to reaching the natural outlet elevation of the closed basin, water will move into other sloughs through outlets at lower elevations. The site will continue to be monitored for any impacts to the roadway as the water level fluctuates over time.

Group Site Name: ND 30

Highway: ND 30

Location (RP, LAT/LON, or SEC/TWP/R): ND 30, Logan County, north of Lehr, RP 0 to RP 1

Owner: State

NHS (yes/no): No

Event Years: 1999, 2011

Description of damage:

1999: Erosion of roadway inslope.

2011: Roadway inundated by water in a closed basin.

Completed Permanent Repairs:

1999: SER-2-030(005)001: Riprap.

2011: SER-2-030(016)000: A permanent grade raise, 5' plus applicable freeboard, was constructed to keep the driving surface out of the water and maintain a safe travel condition. The centerline elevation for the top of the pavement is 1984.5'.

Evaluation:

The permanent grade raise for the 2011 event and the riprap repair for the 1999 event has maintained safe travelling conditions and protected the roadway from further damage. Currently the roadway is nearly 4' below the natural outlet elevation of 1988.1' for the closed basin at this site. The site will continue to be monitored for any impacts to the roadway as the water level fluctuates over time.

Location (RP, LAT/LON, or SEC/TWP/R): ND 34, Logan County, west of Napoleon, RP 25

Owner: State

NHS (yes/no): No

Event Years: 1997, 2010

Description of damage:

1997: High water impacted the roadway.

2010: High water and high winds impacted the entire inslope. Wave action undermined the in-place concrete erosion blanket and destroyed the integrity of the inslope.

Completed Permanent Repairs:

1999: SER-1-034(007)025: Reinforced concrete box and reset concrete erosion blankets.

2010: SER-1-034(017)025: Removed all material from the inslope, reshaped the inslope with gravel class 3 material, and then placed a new concrete erosion blanket. A riprap berm was constructed to act as a wave breaker during high winds.

Evaluation:

The past events at this site have caused damage to the inslope of the roadway. The repairs completed at this site have restored the inslope and provided appropriate erosion protection from further damage by restoring the erosion pads and riprap. No more damage is foreseen at this site with the current erosion control measures in place.

Location (RP, LAT/LON, or SEC/TWP/R): ND 34, Logan County, east of junction with ND 30, RP 49

Owner: State

NHS (yes/no): No

Event Years: 1997, 2020

Description of damage:

1997: High water has inundated the roadway.

2020: Roadway inundated by water in a defined basin.

Completed Permanent Repairs:

1997: SER-2-034(003)049: Permanent grade raise, aggregate base, and riprap.

2020: SERP-2-034(007)049: A 5' permanent grade raise will be constructed to keep the driving surface out of the water and maintain a safe travel condition. The finished subgrade elevation is expected to be 1863.14'.

Evaluation:

The permanent grade raise for the 2020 event will maintain safe travelling conditions, provide adequate clear zone, and protect the roadway from further damage once it is constructed. After the permanent grade raise is completed for the 2020 event, the roadway will be over 20' below the natural outlet elevation of 1887' for the defined basin at this site. The site will continue to be monitored for any impacts to the roadway as the water level fluctuates over time.

Group Site Name: ND 36

Highway: ND 36

Location (RP, LAT/LON, or SEC/TWP/R): ND 36, Kidder County, east of Robinson, RP 53 to RP 54

Owner: State

NHS (yes/no): No

Event Years: 1997, 1999, 2020

Description of damage:

1997: Damage to the roadway inslope.

1999: High water and flooding of roadway.

2020: Erosion and pavement damaged by water in a closed basin.

Completed Permanent Repairs:

1997: SER-1-036(011)053: Erosion pads.

1999: SER-1-036(013)053: Channel construction.

1999: SS- SER-1-036(014)053: Permanent grade raise.

2020: SERP-1-036(032)054: ER eligible work at this site consists of widening with riprap and concrete erosion blankets. A grade raise betterment has been approved. The betterment is a 5' permanent grade raise would be constructed to keep the driving surface out of the water and maintain a safe travel condition. The finished subgrade elevation would expect to be 1770.1'.

Evaluation:

A betterment was approved to construct a permanent grade raise rather than the ER eligible widening with riprap and concrete erosion blankets. Widening with riprap and concrete erosion blankets would be effective against erosion if waters do not rise. Rising water elevations could cause damage to the roadway. A grade raise is a more resilient option that would help prevent loss of use due to future rising waters in the closed basin. If the grade raise is constructed for the 2020 event, the roadway would be nearly 4' below the natural outlet elevation of 1774' for the closed basin at this site. The site will continue to be monitored for any impacts to the roadway as the water level fluctuates over time.

Location (RP, LAT/LON, or SEC/TWP/R): ND 46, Logan & Stutsman Counties, near Gackle, RP 6

Owner: State

NHS (yes/no): No

Event Years: 2009, 2019

Description of damage:

2009: Major state highway inundated by trapped water runoff.

2019: Roadway inundated by water in a defined basin.

Completed Permanent Repairs:

2009: SER-2-046(031)006: A 5' permanent grade raise was constructed to keep the driving surface out of the water and maintain a safe travel condition. The elevation for the top of the pavement was 1893.4'.

2019: SERP-2-046(051)006: A permanent grade raise will be constructed 5' higher than the existing water surface to keep the driving surface out of the water and maintain a safe travel condition. The finished subgrade elevation is expected to be 1899.51'.

Evaluation:

The permanent grade raise for the 2019 event will maintain safe travelling conditions, provide adequate clear zone, and protect the roadway from further damage once it is constructed. After the permanent grade raise is completed for the 2019 event, the roadway will be over 10' below the natural outlet elevation of 1912' for the defined basin at this site. Prior to reaching the natural outlet elevation of the defined basin, water will move into another slough through an outlet at a lower elevation. The site will continue to be monitored for any impacts to the roadway as the water level fluctuates over time.

Location (RP, LAT/LON, or SEC/TWP/R): ND 46, Logan County, west of Gackle, RP 8 to RP 9

Owner: State

NHS (yes/no): No

Event Years: 2011, 2020

Description of damage:

2011: Roadway inundated by water in a defined basin.

2020: Roadway inundated by water in a defined basin.

Completed Permanent Repairs:

2011: SER-2-046(038)008: A 9.5' permanent grade raise was constructed to keep the driving surface out of the water and maintain a safe travel condition from RP 8.6 to RP 9.2. The elevation for the top of the pavement was 1905.3'.

2020: SERP-2-046(053)008: A permanent grade raise, approximately 8.25', will be constructed from RP 8.0 to RP 8.6 to keep the driving surface out of the water, maintain a safe travel condition, and match the elevation of the grade raise constructed for the 2011 event. The finished subgrade elevation is expected to be 1904.5'. The elevation for the top of the pavement is expected to be 1905.3'.

Evaluation:

The permanent grade raise for the 2020 event will be like the repairs from the 2011 event and maintain safe travelling conditions, provide adequate clear zone, and protect the roadway from further damage once it is constructed. After the permanent grade raise is completed for the 2020 event, the roadway will be nearly 15' below the natural outlet elevation of 1920' for the defined basin at this site. The site will continue to be monitored for any impacts to the roadway as the water level fluctuates over time.

Group Site Name: ND 56

Highway: ND 56

Location (RP, LAT/LON, or SEC/TWP/R): ND 56, Logan County, south of Gackle, RP 46 to RP 50

Owner: State

NHS (yes/no): No

Event Years: 1997, 2010, 2020

Description of damage:

1997: High water inundated the roadway.

2010: Highway inundated with water overtopping the roadway.

2020: Roadway inundated by water in a defined basin.

Completed Permanent Repairs:

1997: SER-2-056(015)046: Permanent grade raise, aggregate base, and riprap.

1997: SER-2-056(019)046: Hot bituminous pavement from RP 46 to RP 50.

2010: SER-2-056(025)048: A 4.1' permanent grade raise above the existing water elevation was constructed to keep the driving surface out of the water and maintain a safe travel condition. The centerline elevation for the top of the pavement was 1895.8'.

2020: SERP-2-056(032)048: A permanent grade raise, approximately 9.5', will be constructed to keep the driving surface out of the water and maintain a safe travel condition. The elevation will match the permanent grade raises on ND 46 from RP 8.0 to RP 9.2, since the sloughs at these sites are connected. The finished subgrade elevation is expected to be 1904.5'.

Evaluation:

The sloughs at this site are connected to the slough at the site of ND 46 from RP 8.0 to RP 9.2. The permanent grade raise for the 2020 event will be like the permanent grade raise on ND 46 and maintain safe travelling conditions, provide adequate clear zone, and protect the roadway from further damage once it is constructed. After the permanent grade raise is completed for the 2020 event, the roadway will be nearly 15' below the natural outlet elevation of 1920' for the defined basin at this site. Prior to reaching the natural outlet elevation of the defined basin, water will move into another slough through an outlet at a lower elevation. The site will continue to be monitored for any impacts to the roadway as the water level fluctuates over time.

Group Site Name: Kidder County

Highway: CMC 2215

Location (RP, LAT/LON, or SEC/TWP/R): 1.5 Miles west and 3 Miles south of Robinson

Owner: County

NHS (yes/no): No

Event Years: 2014, 2019

Description of damage:

2014: Roadway inundated by water in a defined basin.

2019: Roadway inundated by water in a defined basin.

Completed Permanent Repairs:

2014: CER-CNOC-2215(058)

- 3' permanent grade raise, HBP, rip rap, completed in 2017.

2019: CER-2215(059)

- A permanent grade raise is planned for construction in 2022 that will raise the centerline subgrade elevation to 2' above the outlet elevation.

Evaluation:

Once the permanent grade raise is completed to the ultimate elevation the site will no longer be threatened by inundation. The permanent grade raise will maintain safe travelling conditions, provide adequate clear zone, and protect the roadway from further damage.

Group Site Name: Logan County

Highway: CMC 2406

Location (RP, LAT/LON, or SEC/TWP/R): 4 mi N & 2.5 mi E of Napoleon

Owner: County

NHS (yes/no): No

Event Years: 2011, 2020

Description of damage:

2014: Roadway inundated by water in a defined basin.

2019: Roadway inundated by water in a defined basin.

Completed Permanent Repairs:

2011: CER-2431(053)

- 2’ emergency grade raise, permanent work was widening and riprap

2019: CER-2431(060)

- A permanent grade raise is planned for construction in 2022 that will raise the centerline subgrade elevation to 2’ above the outlet elevation.

Evaluation:

Once the permanent grade raise is completed to the ultimate elevation the site will no longer be threatened by inundation. The permanent grade raise will maintain safe travelling conditions, provide adequate clear zone, and protect the roadway from further damage.

Group Site Name: Sargent

Highway: CMC 4110 & 4135

Location (RP, LAT/LON, or SEC/TWP/R): 6.5 miles north of Geneseo

Owner: County

NHS (yes/no): No

Event Years: 2010, 2011

Description of damage:

2010: Roadway inundated

2011: Roadway damaged by flowing water

Completed Permanent Repairs:

2010: CER-4110(058), CER-4110(059) & CER-4135(054)

- Permanent work consisted of grade raises at three sites along with inslope protection.

2011: CER-4110(064)

- Permanent work consisted of replacing riprap at the end of a pipe that was damage by high flows.

Evaluation:

Sites were damaged by flooding Wild Rice river. The grade raise, inslope protection, and culvert protections are anticipated to prevent any future damage at these locations.

Highway: CMC 4711

Location (RP, LAT/LON, or SEC/TWP/R): 7 miles S of I-94

Owner: County

NHS (yes/no): No

Event Years: 2010, 2011

Description of damage:

2009: Roadway inundated

2011: Roadway inundated

Completed Permanent Repairs:

2009: CER-4711(051)

- Permanent work consisted of 2' grade raise with inslope protection.

2011: CER-4711(052)

- 2' Emergency Grade Raise. Permanent work consisted of widening to flatten inslopes and installing inslope protection. County elected to not complete permanent grade raise due to funding constraints.

Evaluation:

Site is still vulnerable inundation if the water elevation rises due to a future event. The roadway currently provides safe travelling conditions, provides adequate clear zone, and the inslope is protected at the current water level.

Highway: CMC 4717

Location (RP, LAT/LON, or SEC/TWP/R): 5.7 Miles N of Gackle

Owner: County

NHS (yes/no): No

Event Years: 1997, 2011

Description of damage:

1997: Roadway inundated

2011: Roadway inundated

Completed Permanent Repairs:

1997: CER-4717(054)

- Permanent work consisted of 2' grade raise, inslope protection, and HBP.

2011: CER-4711(088)

- Permanent work consisted of 3.6' grade raise, inslope protection and HBP. The consultant was not able to determine a reasonable ultimate elevation, so the grade was raised to accommodate the storage required for a 100-year storm event plus two feet of freeboard.

Evaluation:

The site is still vulnerable to inundation if the water elevation rises due to a future event. The roadway currently provides safe travelling conditions, provides adequate clear zone, and the inslope is protected at the current water level.

Group Site Name: Stutsman 3

Highway: CMC 4717

Location (RP, LAT/LON, or SEC/TWP/R): 3 mi N of Gackle

Owner: County

NHS (yes/no): No

Event Years: 2007, 2011

Description of damage:

2007: Roadway inundated

2011: Roadway inundated

Completed Permanent Repairs:

2007: CER-4717(062) & CER-4717(064)

- Permanent work consisted of 2' grade raise, inslope protection. HBP was planned as permanent work, but never completed due to continuous flooding.

2011: CER-4711(090)

- Permanent work consisted of 3.1' grade raise, inslope protection and HBP. The County elected not to raise the grade to the ultimate elevation or realign the road due to funding constraints. The grade was raised to accommodate three years of storage plus two feet of freeboard.

Evaluation:

The site is still vulnerable to inundation if the water elevation rises due to a future event. The roadway currently provides safe travelling conditions, provides adequate clear zone, and the inslope is protected at the current water level.

Highway: CMC 4717

Location (RP, LAT/LON, or SEC/TWP/R): 2 mi S of Cleveland

Owner: County

NHS (yes/no): No

Event Years: 2009, 2011

Description of damage:

2009: Roadway inundated

2011: Roadway inundated

Completed Permanent Repairs:

2009: CER-4717(067) & CER-4717(083)

- Permanent work consisted of 2' grade raise, inslope protection. HBP was done as separate project in 2012.

2011: CER-4711(085)

- Permanent work consisted of 3.5' grade raise, inslope protection and HBP. The County elected not to raise to the grade to the ultimate elevation or realign the road due to funding constraints. The grade was raised to accommodate three years of storage plus two feet of freeboard.

Evaluation:

The site is still vulnerable to inundation if the water elevation rises due to a future event. The roadway currently provides safe travelling conditions, provides adequate clear zone, and the inslope is protected at the current water level.

Highway: CMC 4742

Location (RP, LAT/LON, or SEC/TWP/R): 7 mi N of Gackle

Owner: County

NHS (yes/no): No

Event Years: 2009, 2011

Description of damage:

2009: Roadway inundated

2011: Roadway inundated

Completed Permanent Repairs:

2007: CER-4742(059)

- Permanent work consisted of 2' grade raise, inslope protection and aggregate surfacing.

2011: CER-4742(061)

- Permanent work consisted of 2' grade raise, inslope protection and aggregate surfacing. Since this is a gravel road a hydraulic analysis was not completed, and the county elected to raise the grade 2' and not investigate realignment or raising the grade above the ultimate elevation.

Evaluation:

The site is still vulnerable to inundation if the water elevation rises due to a future event. The roadway currently provides safe travelling conditions, provides adequate clear zone, and the inslope is protected at the current water level.

Group Site Name: Stutsman 6

Highway: CMC 4746

Location (RP, LAT/LON, or SEC/TWP/R): 7 mi N of Gackle

Owner: County

NHS (yes/no): No

Event Years: 1997, 2011

Description of damage:

1997: Roadway inundated

2011: Roadway inundated

Completed Permanent Repairs:

1997: CER-4746(052)

- Permanent work consisted of 2' grade raise, inslope protection and aggregate surfacing.

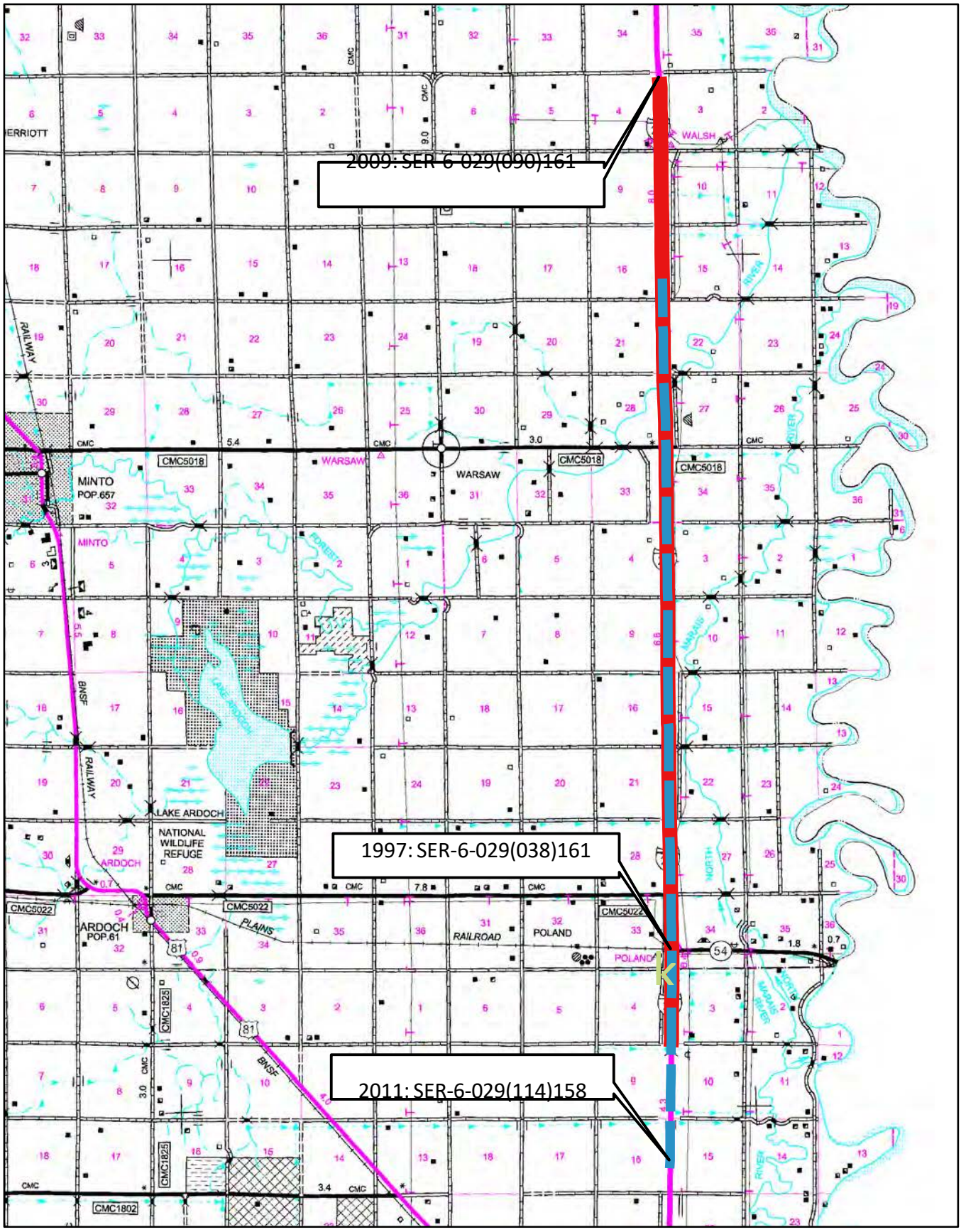
2011: CER-4742(054)

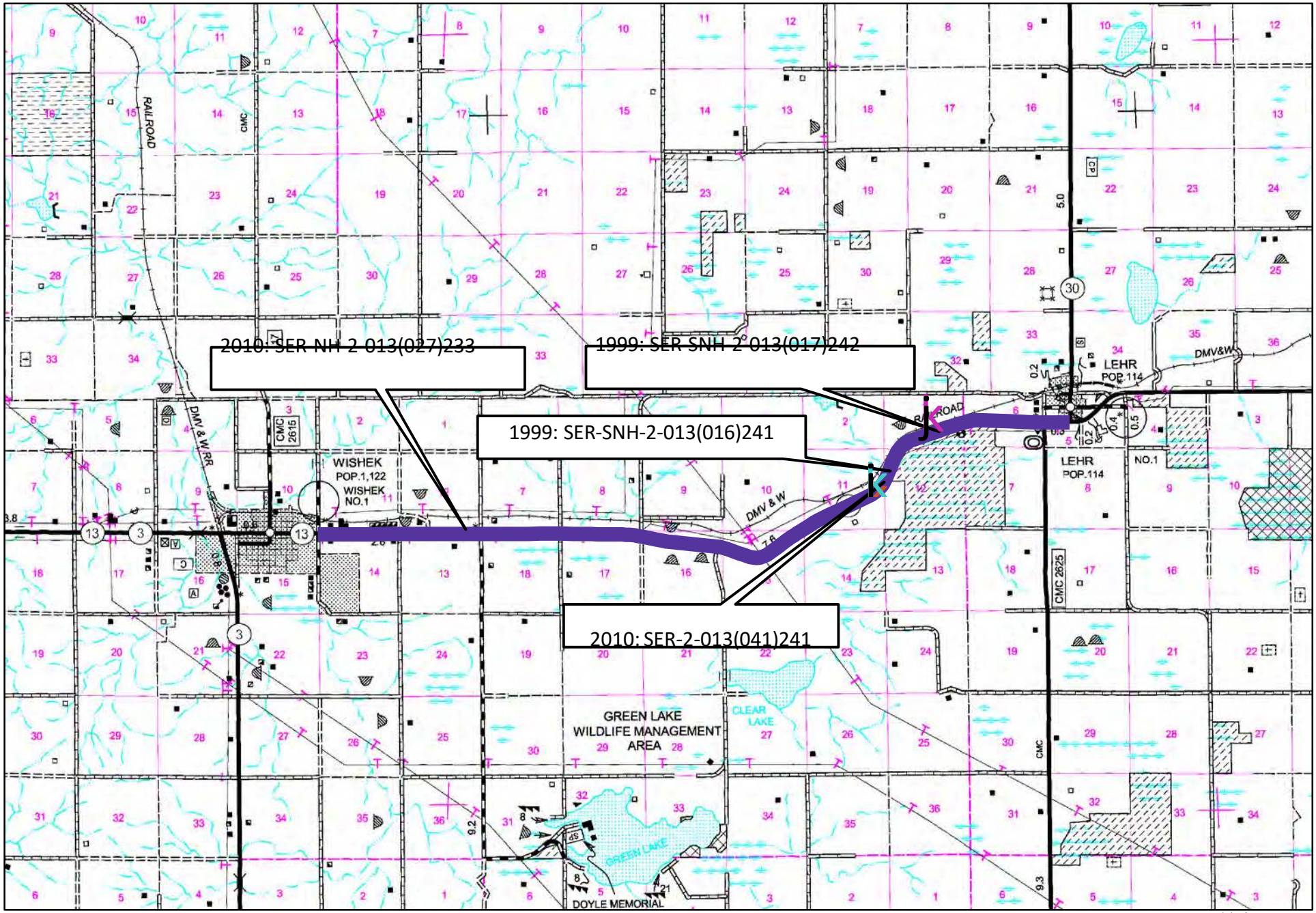
- Permanent work consisted of salvaging riprap from emergency grade raise, widening and flattening inslope, and reinstalling inslope protection and aggregate surfacing. The county elected not to complete the permanent grade raise. In 2019, this site was again inundated. The County elected not to pursue this as an ER site and are considering locally funded options.

Evaluation:

The site is still vulnerable to inundation if the water elevation rises due to a future event.

Group Site: I-29

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WISHEK
NO.1
LEHR
POP.114
LEHR
POP.114
NO.1
GREEN LAKE
WILDLIFE MANAGEMENT
AREA
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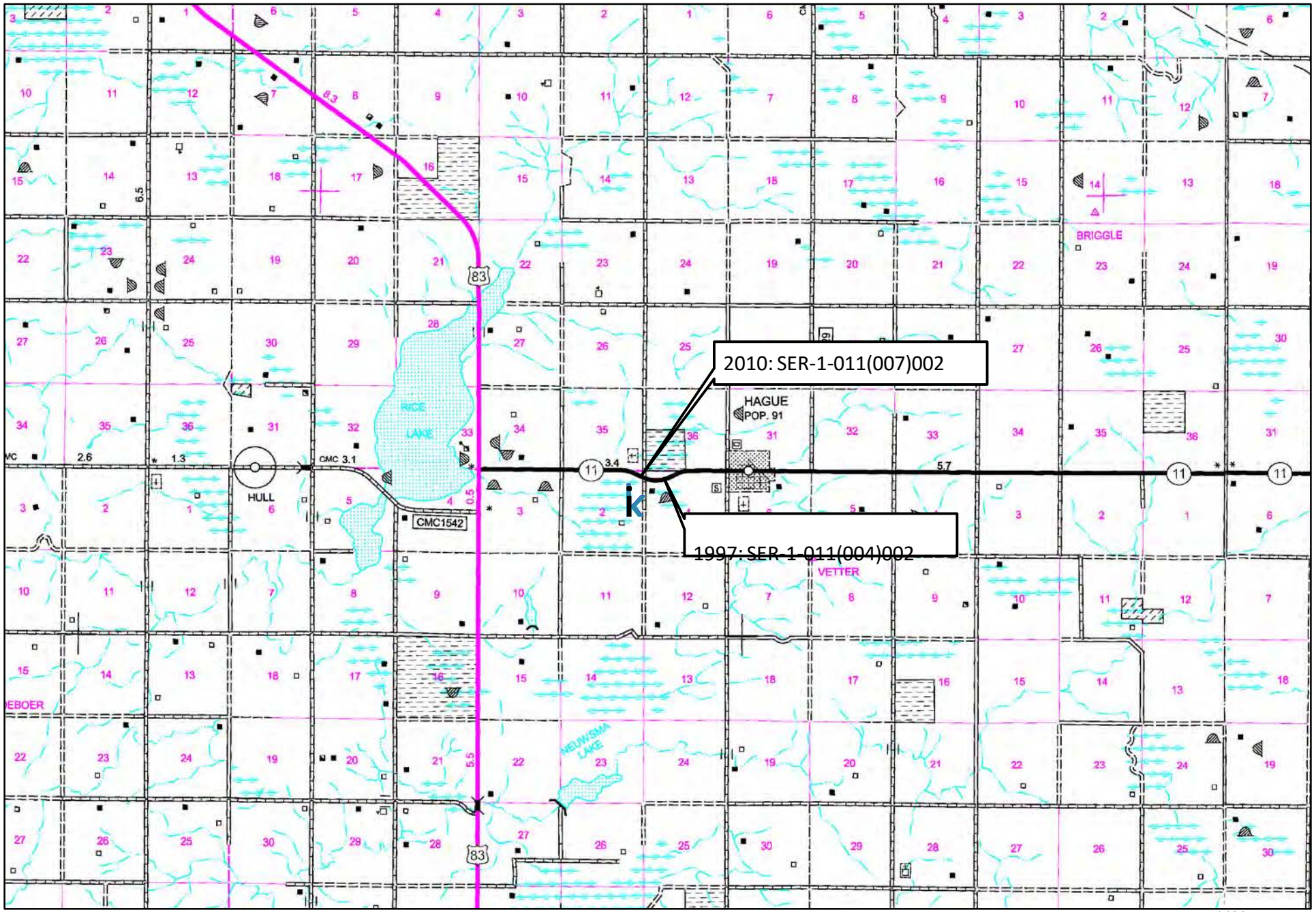
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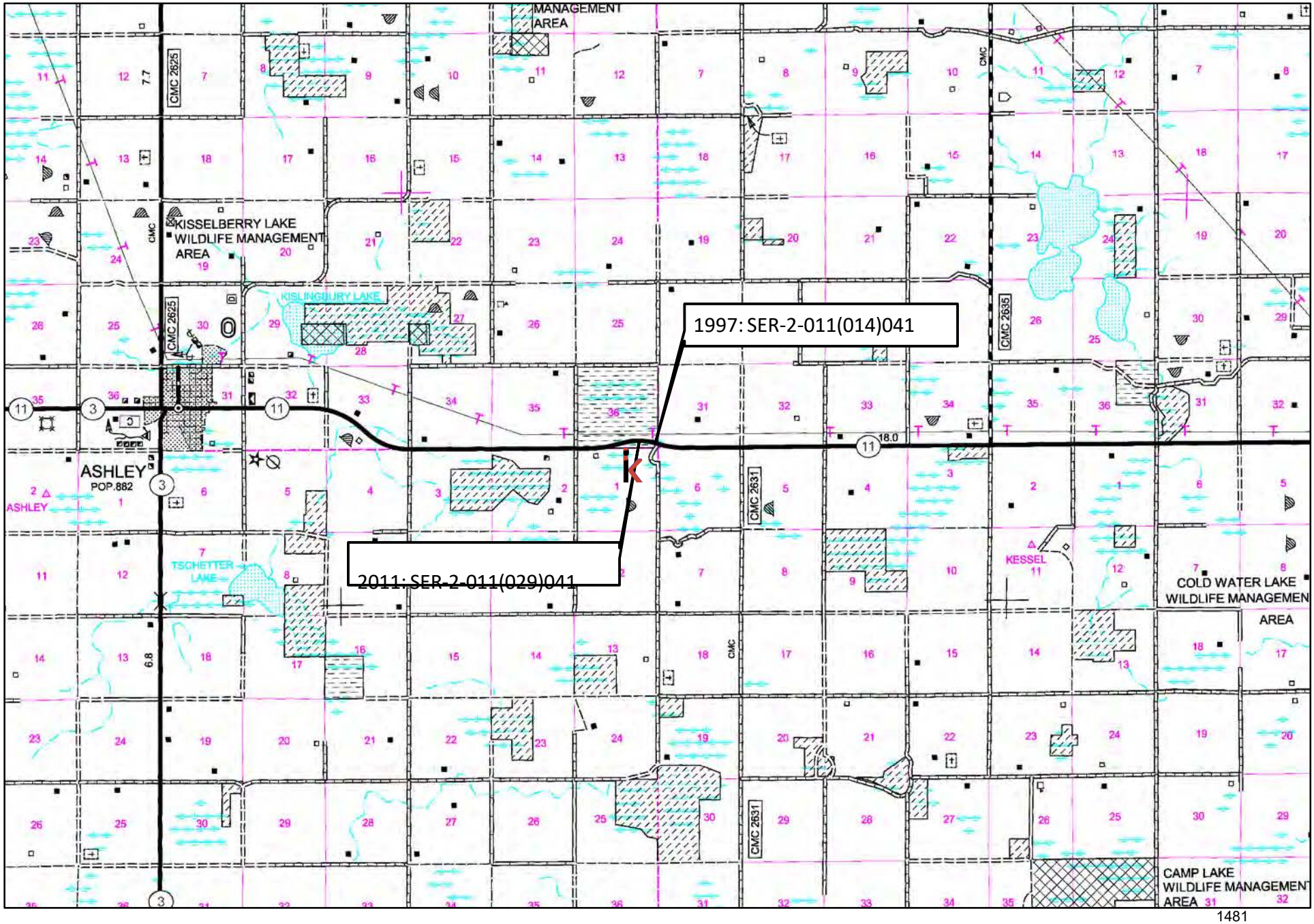
11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POP.882
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WILDLIFE MANAGEMENT
AREA
KISLINGBURY LAKE
TSCHETTER
LAKE
KESSEL
COLD WATER LAKE
WILDLIFE MANAGEMEN
AREA
CAMP LAKE
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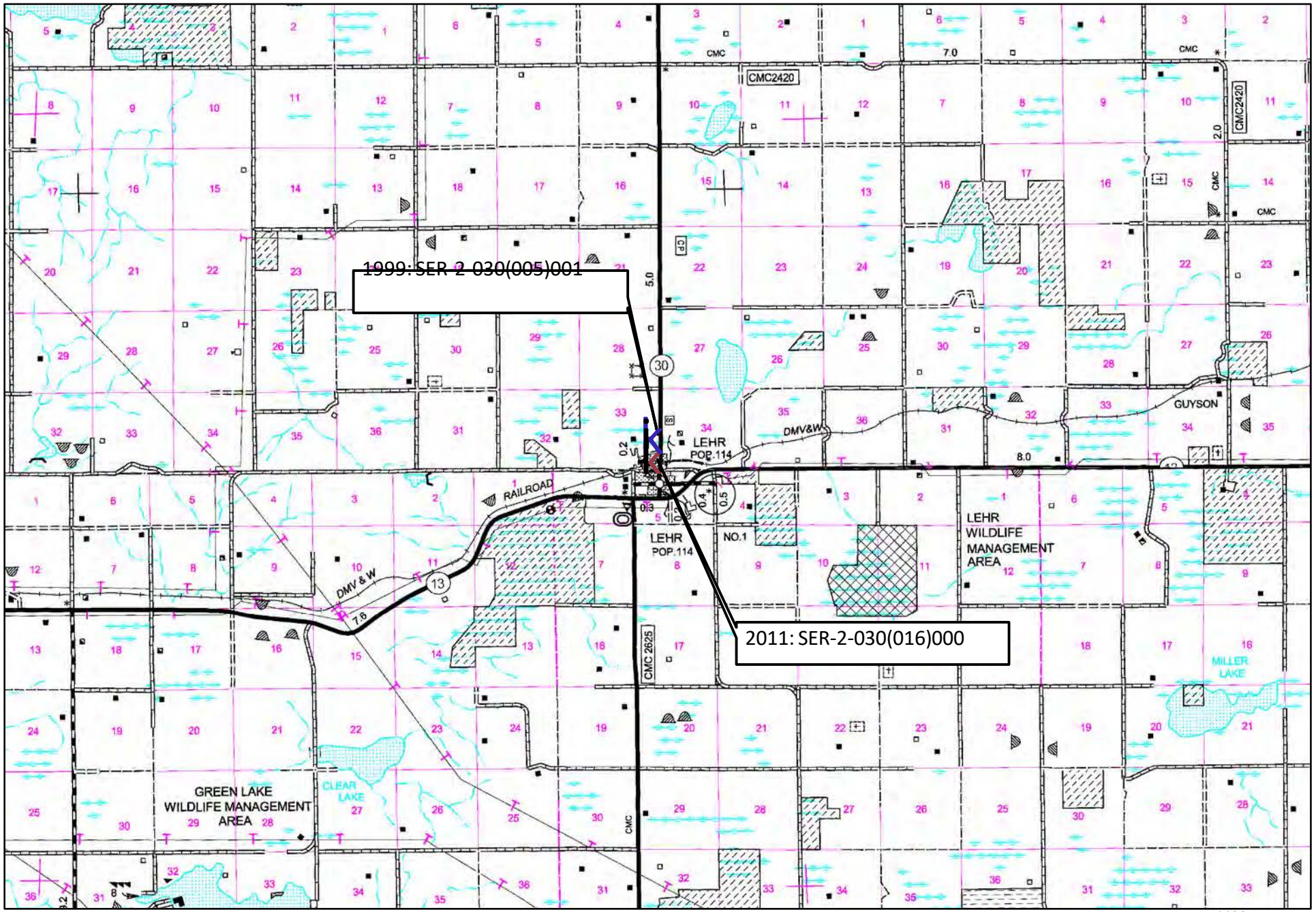
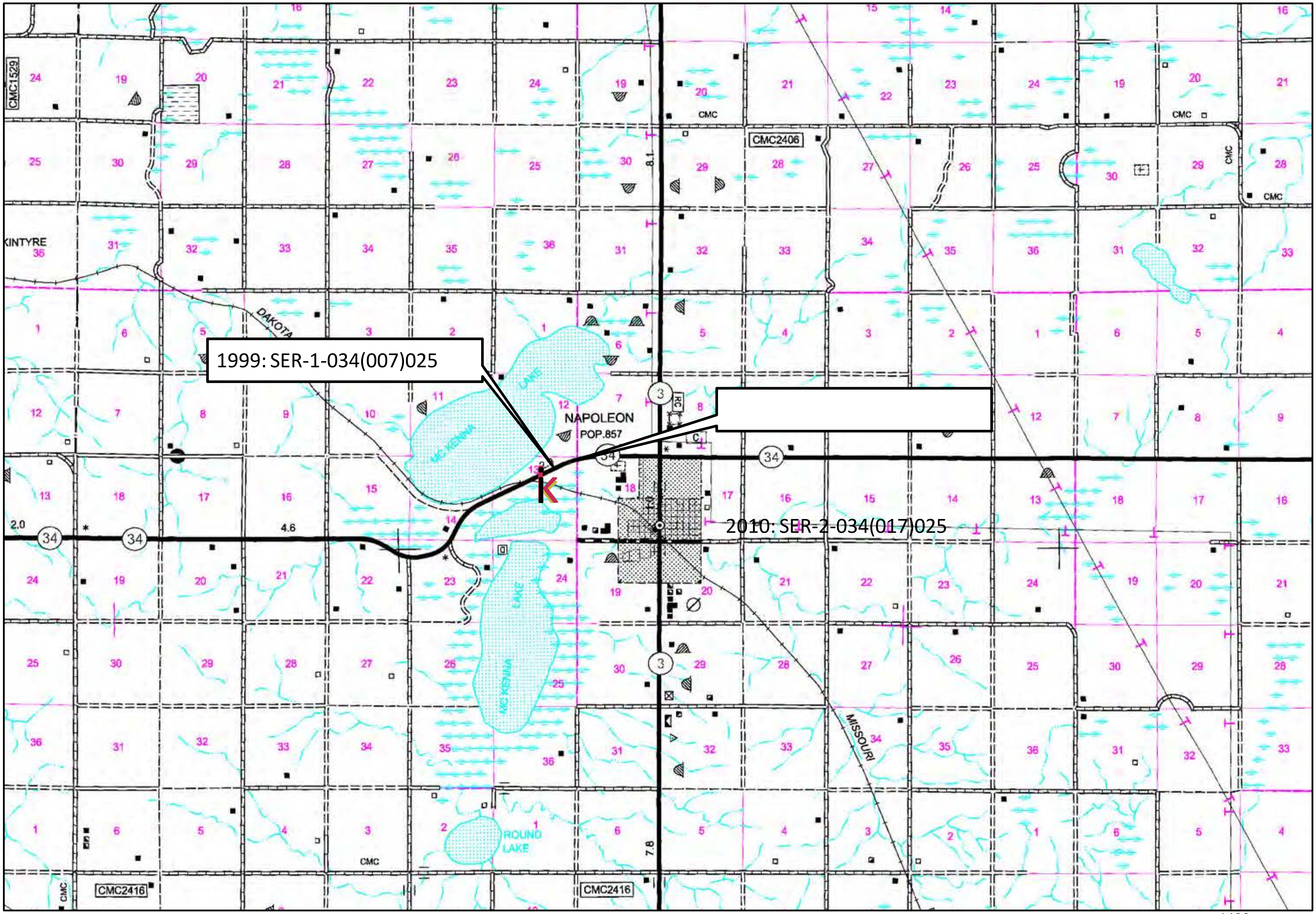
6.8

Group Site: ND 30

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MC KENNA
LAKE
ROUND
LAKE
MISSOURI
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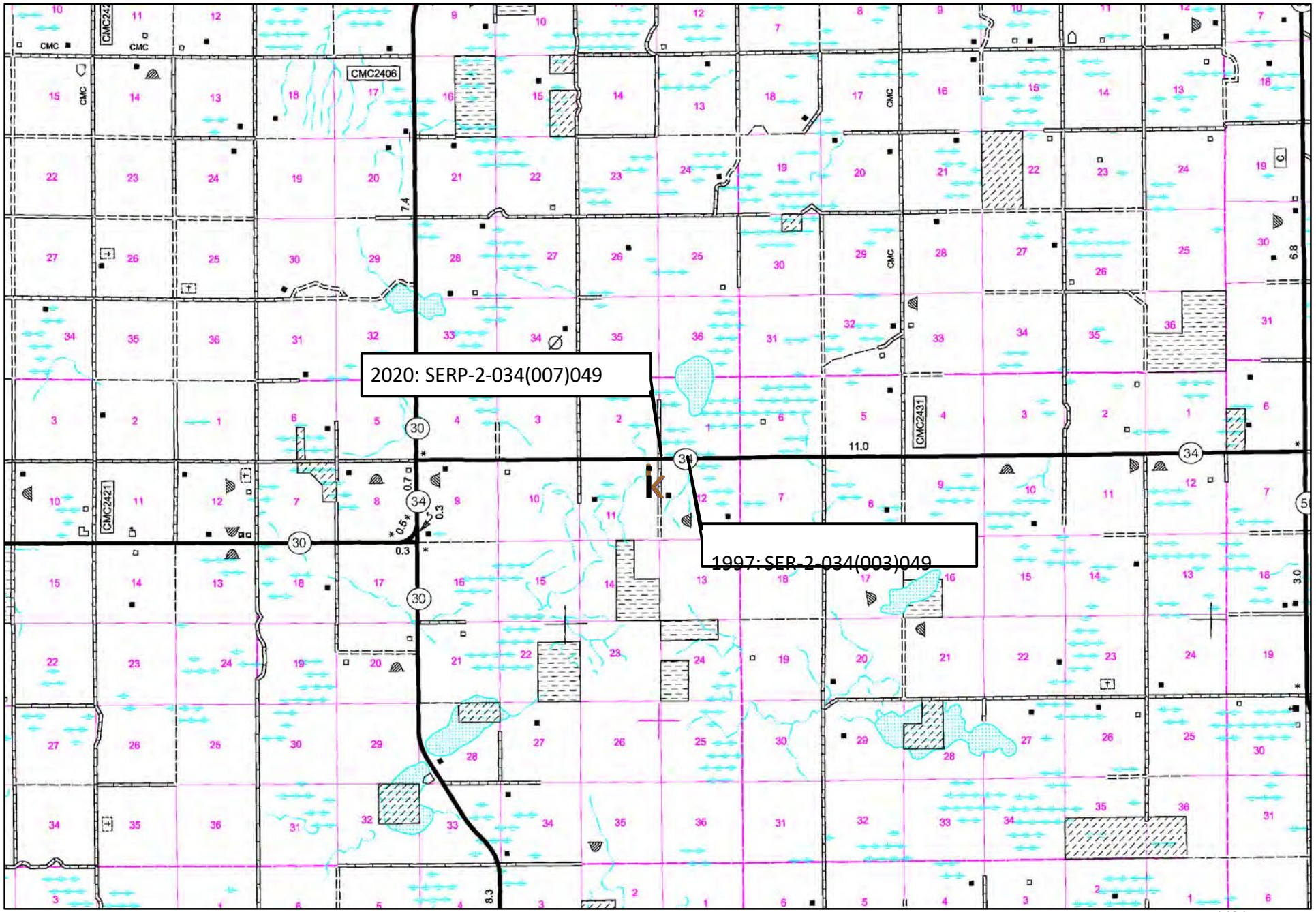
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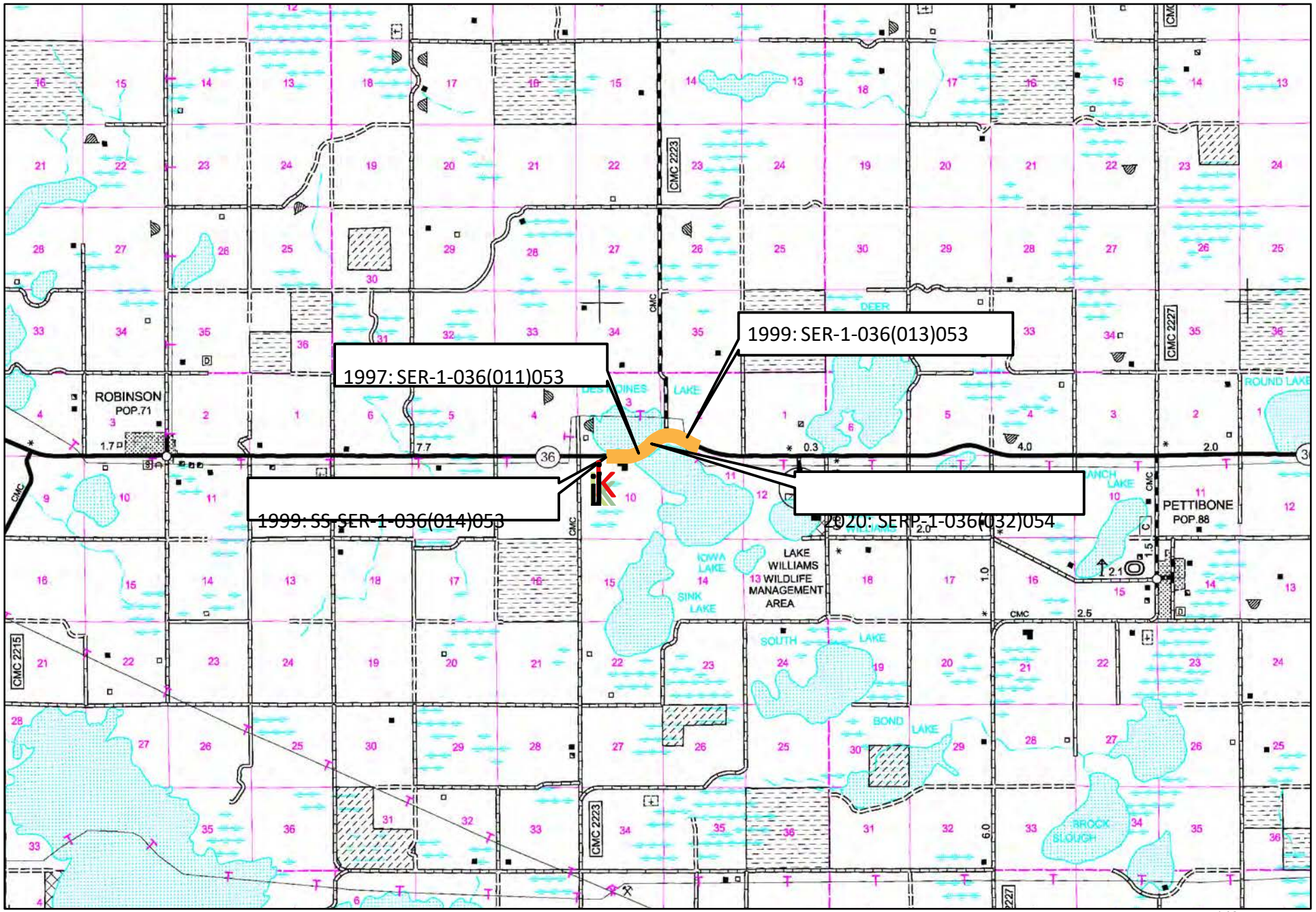
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2020: SERP-1-036(032)054
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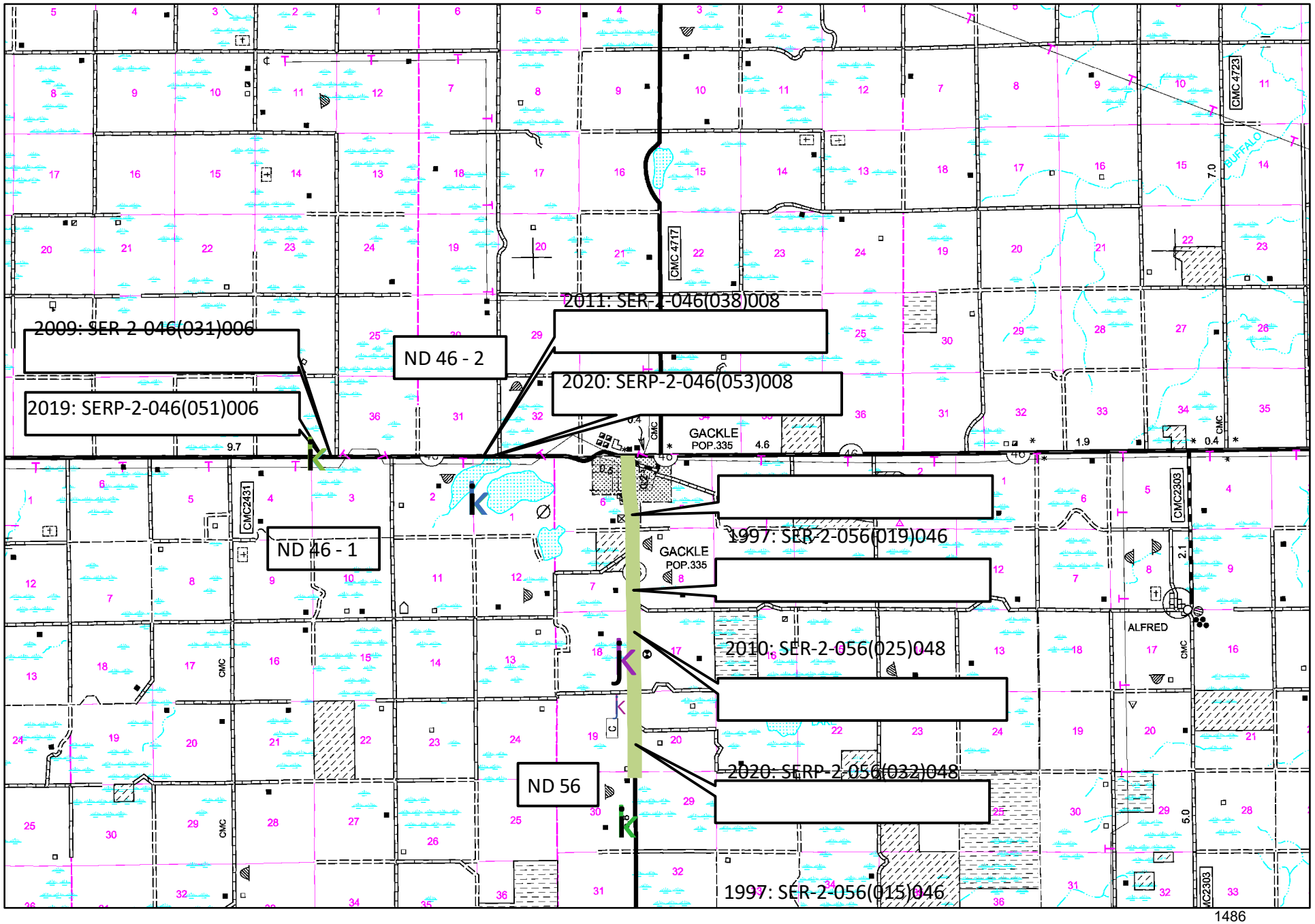
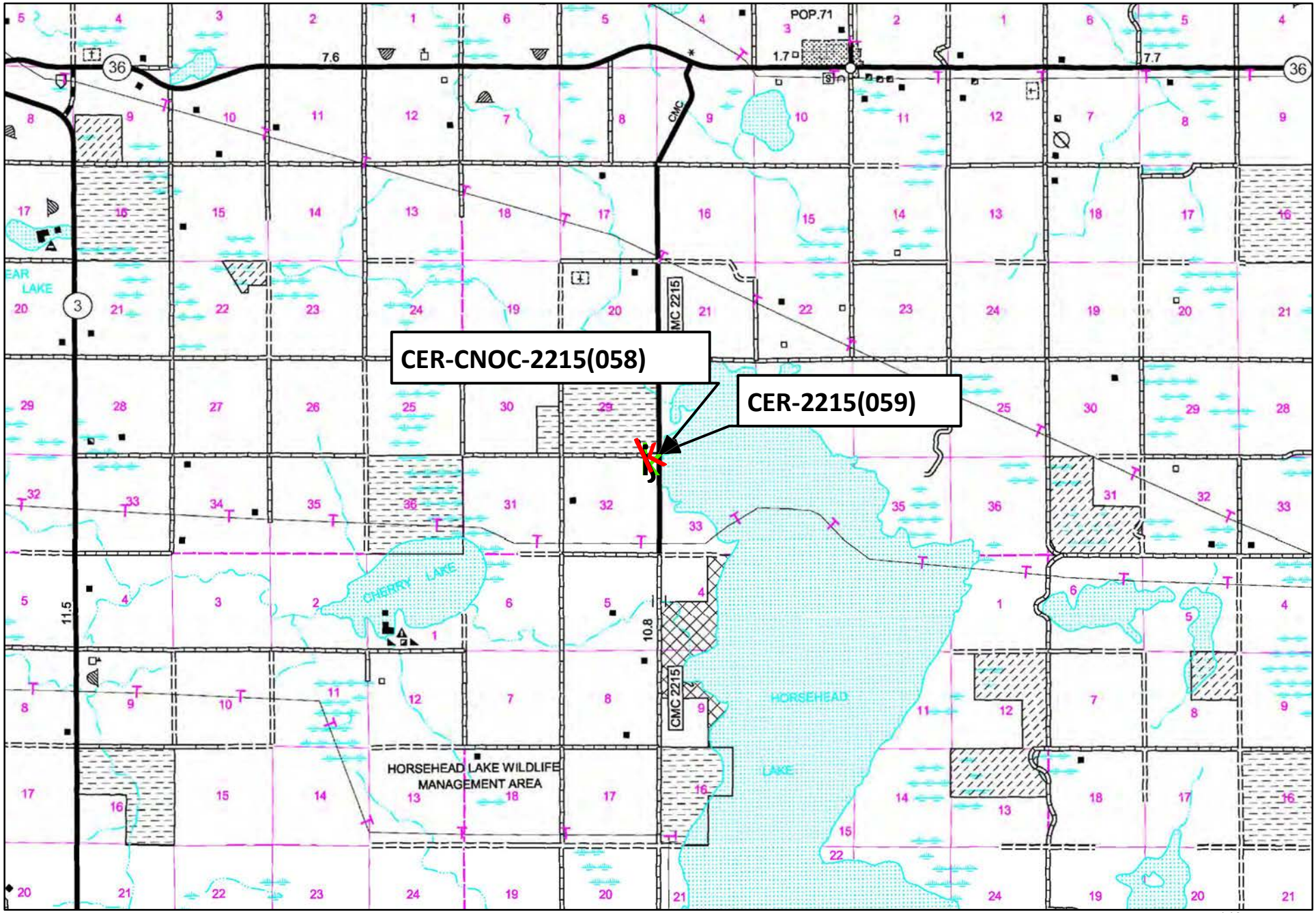
POP.71
PETTIBONE
POP.88
LAKE WILLIAMS WILDLIFE MANAGEMENT AREA
IOWA LAKE
SINK LAKE
SOUTH LAKE
BOND LAKE
BROCK SLOUGH
DEER LAKE
ROUND LAKE
CMC 2223
CMC 2227
CMC 2215
36

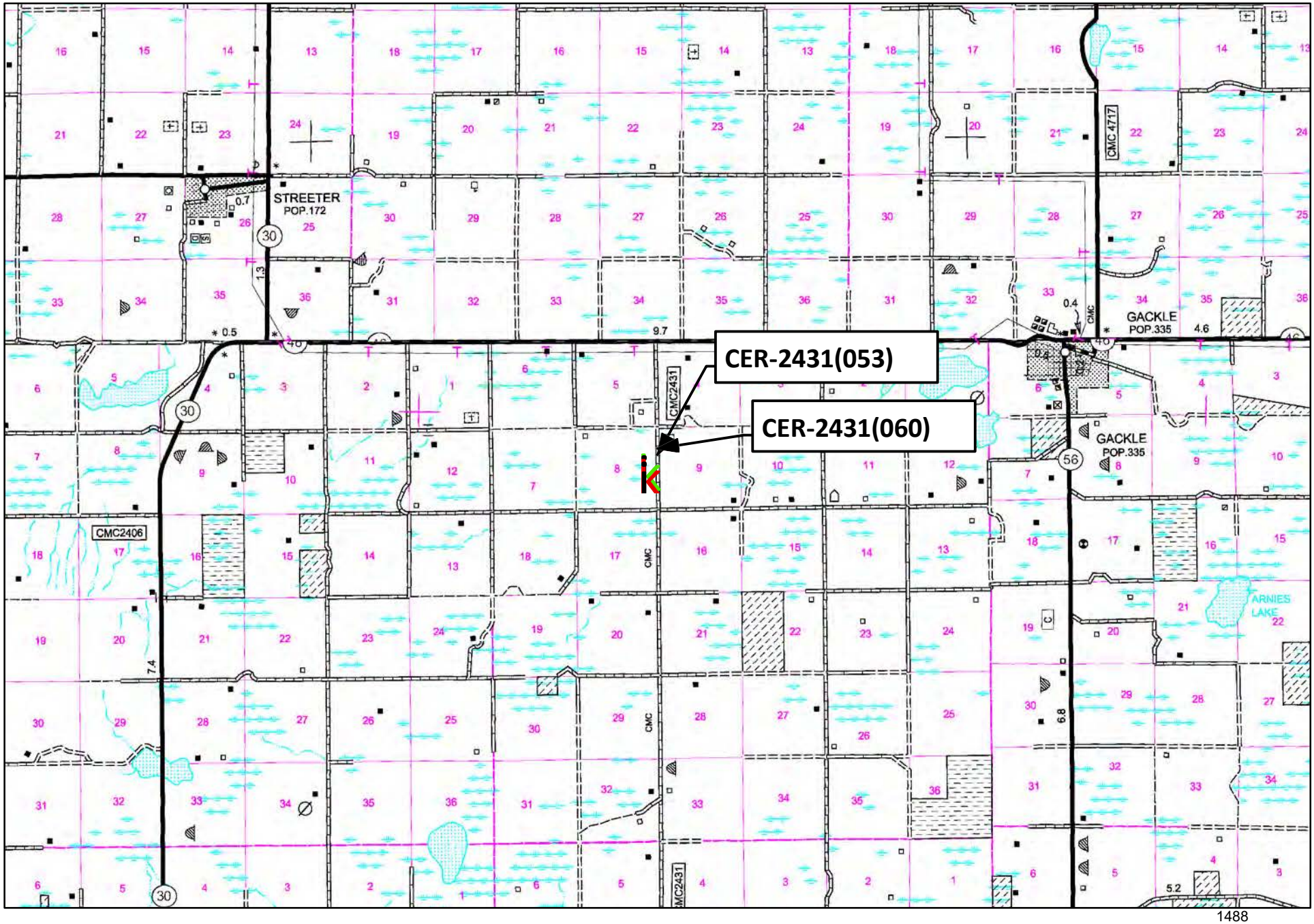
Group Sites: ND 46 - 1, ND 46 - 2, & ND 56



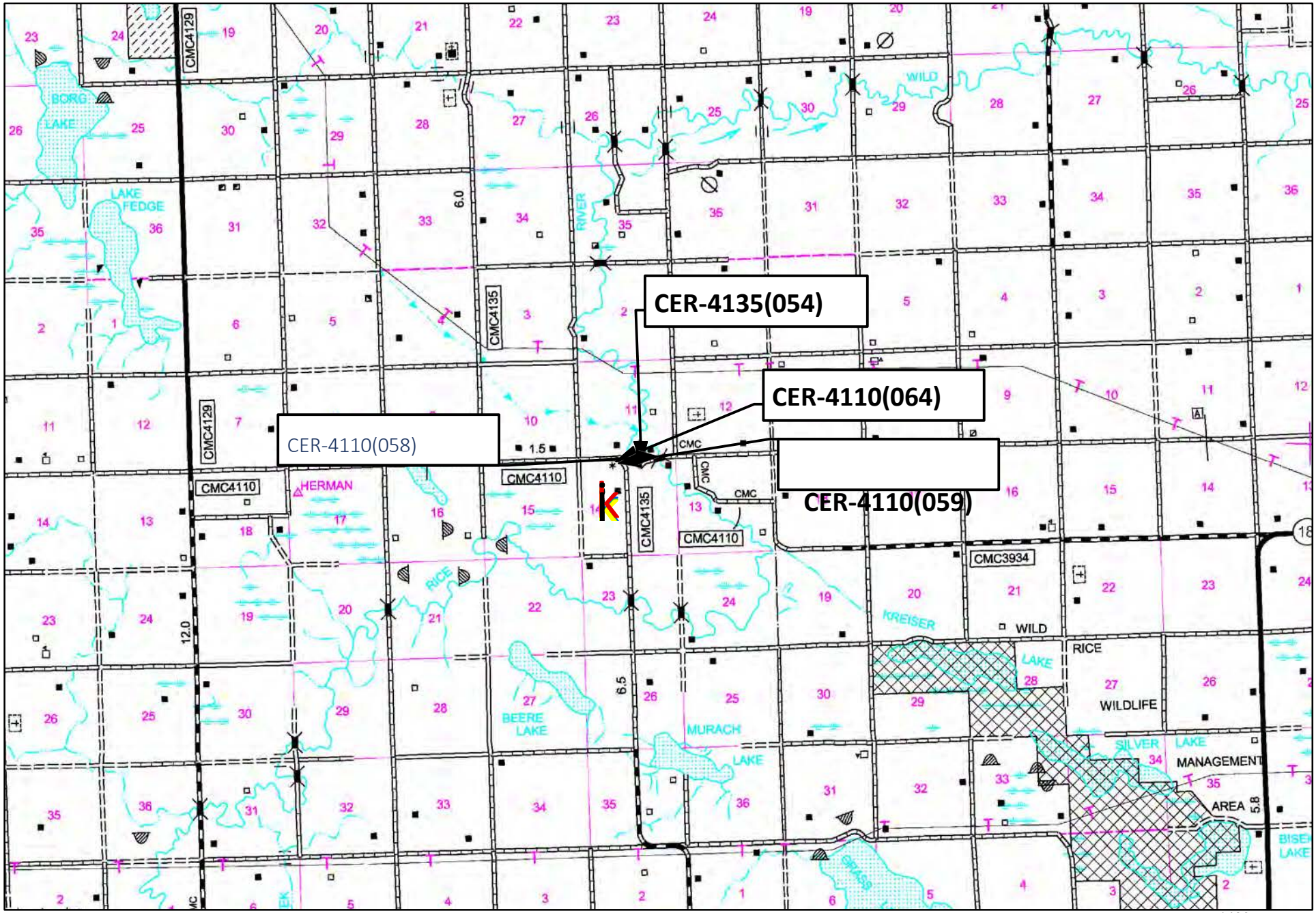
Group Site Name: Kidder County

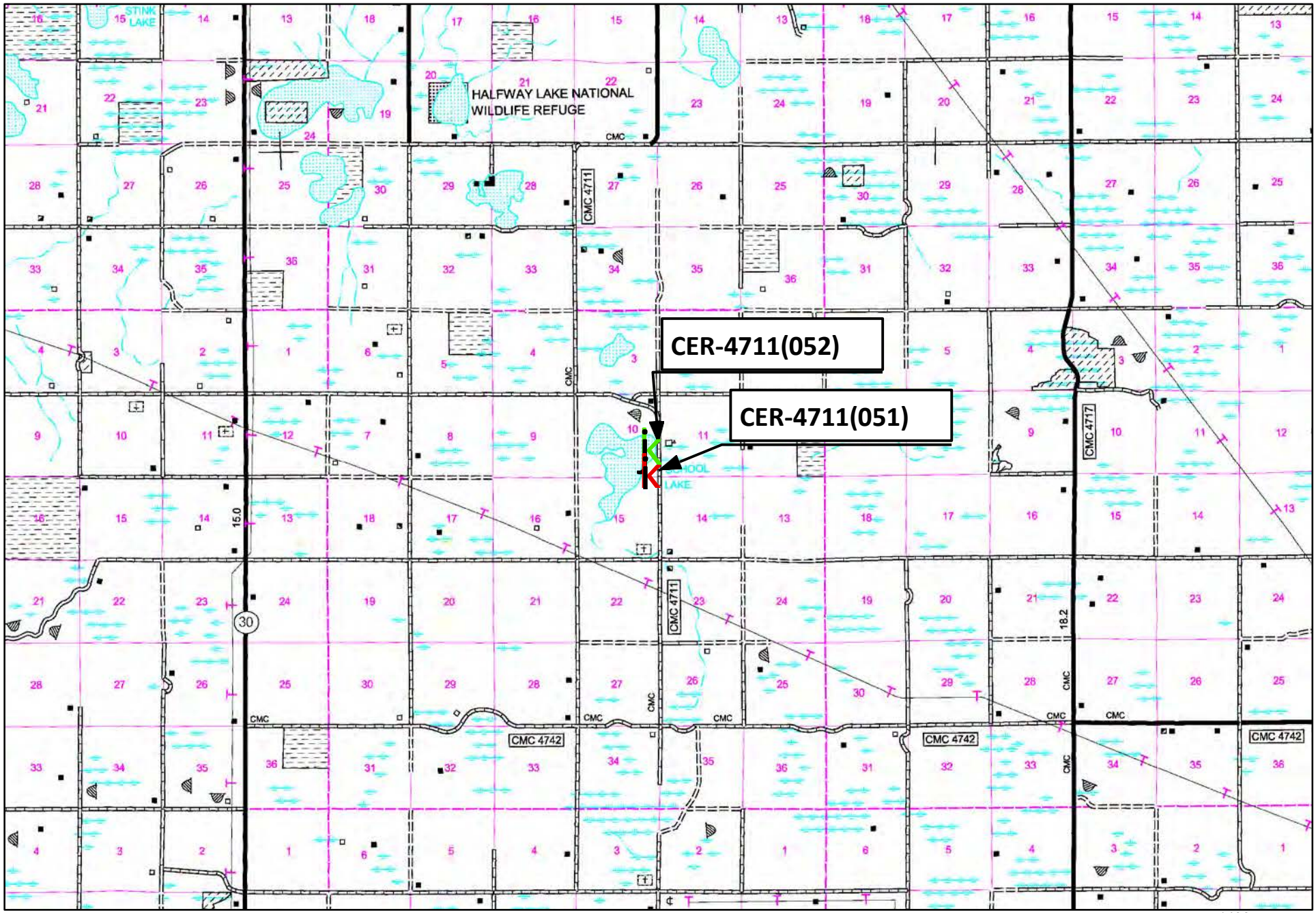


Group Site Name: Logan County



Group Site Name: Sargent County

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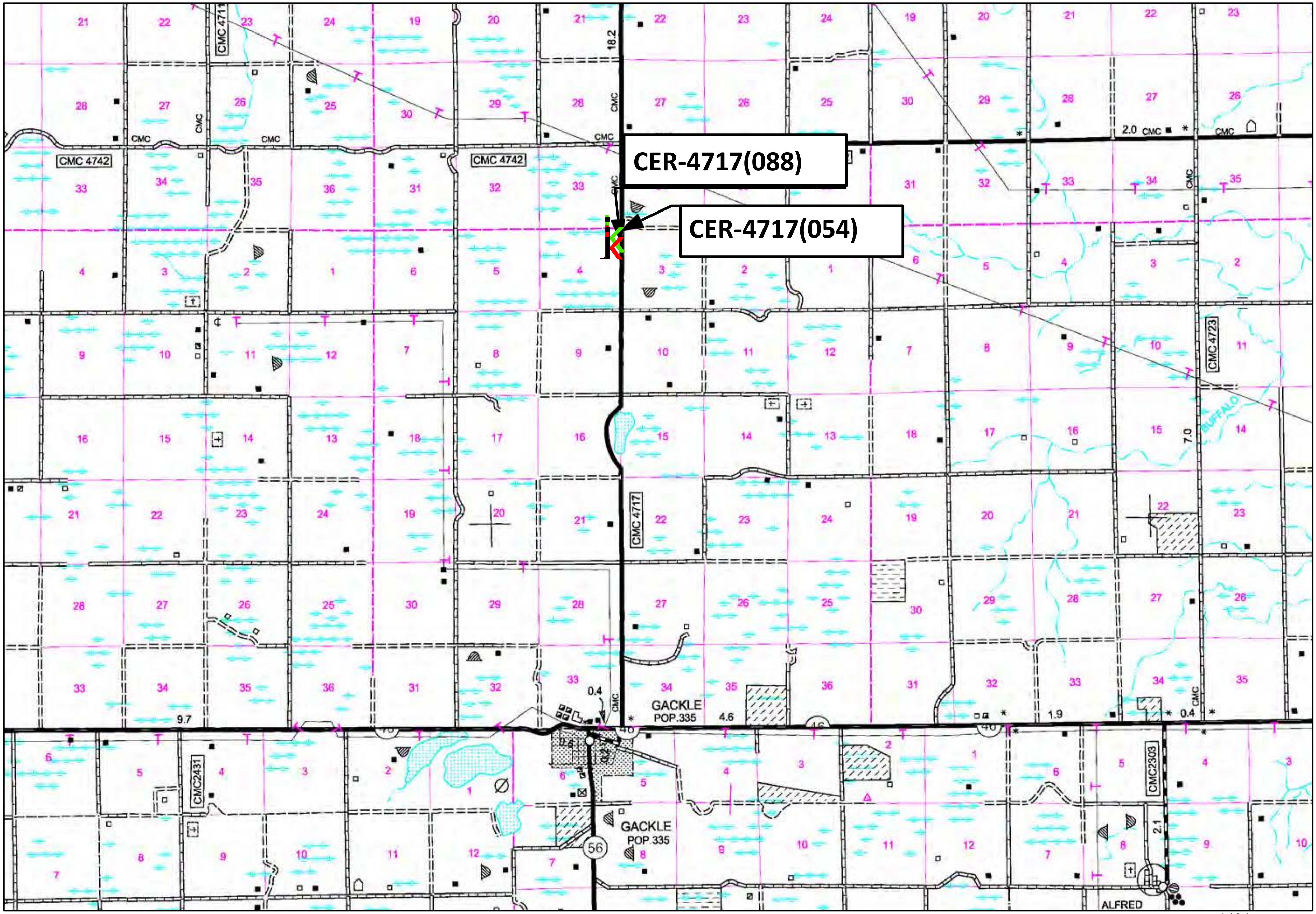
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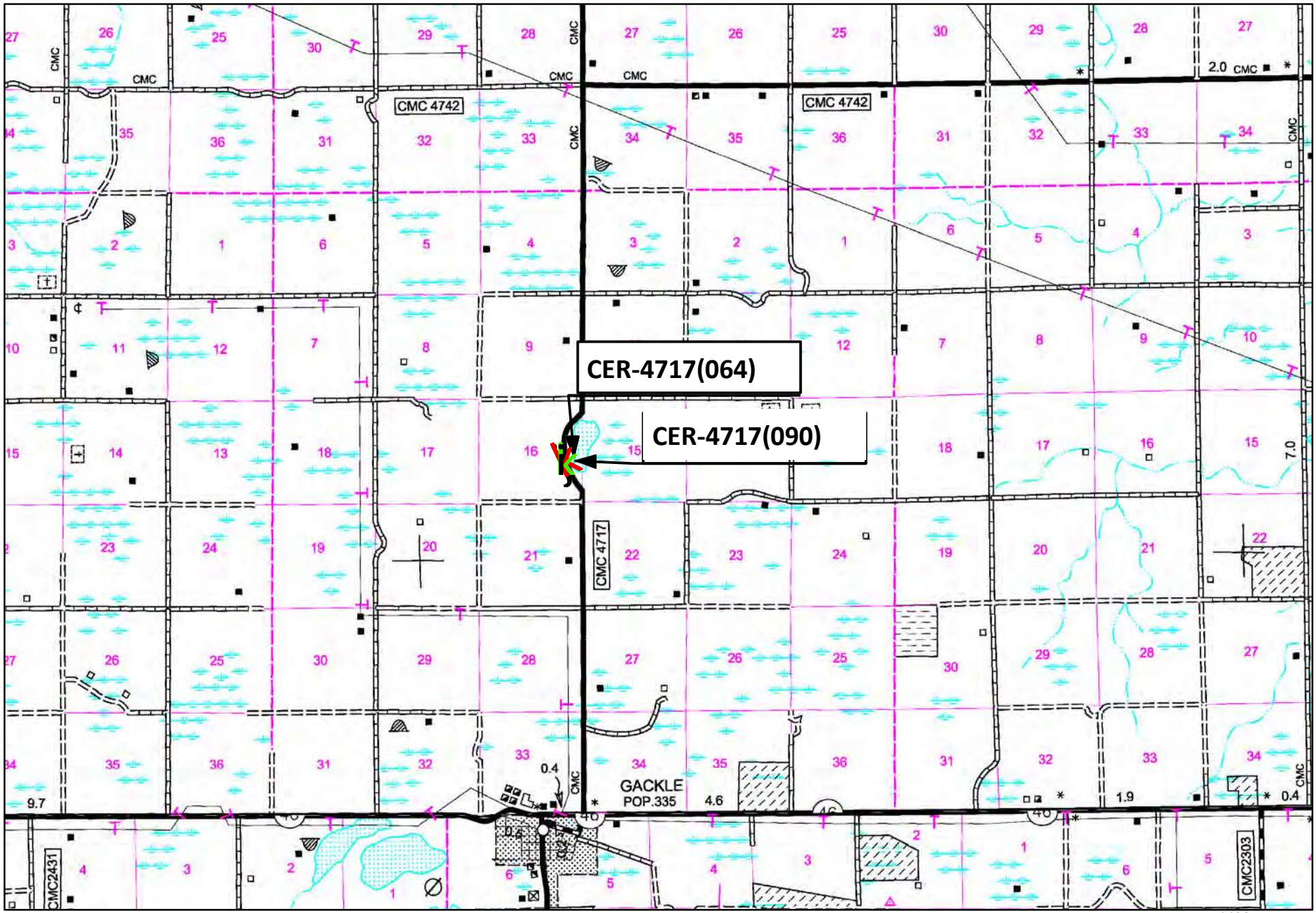
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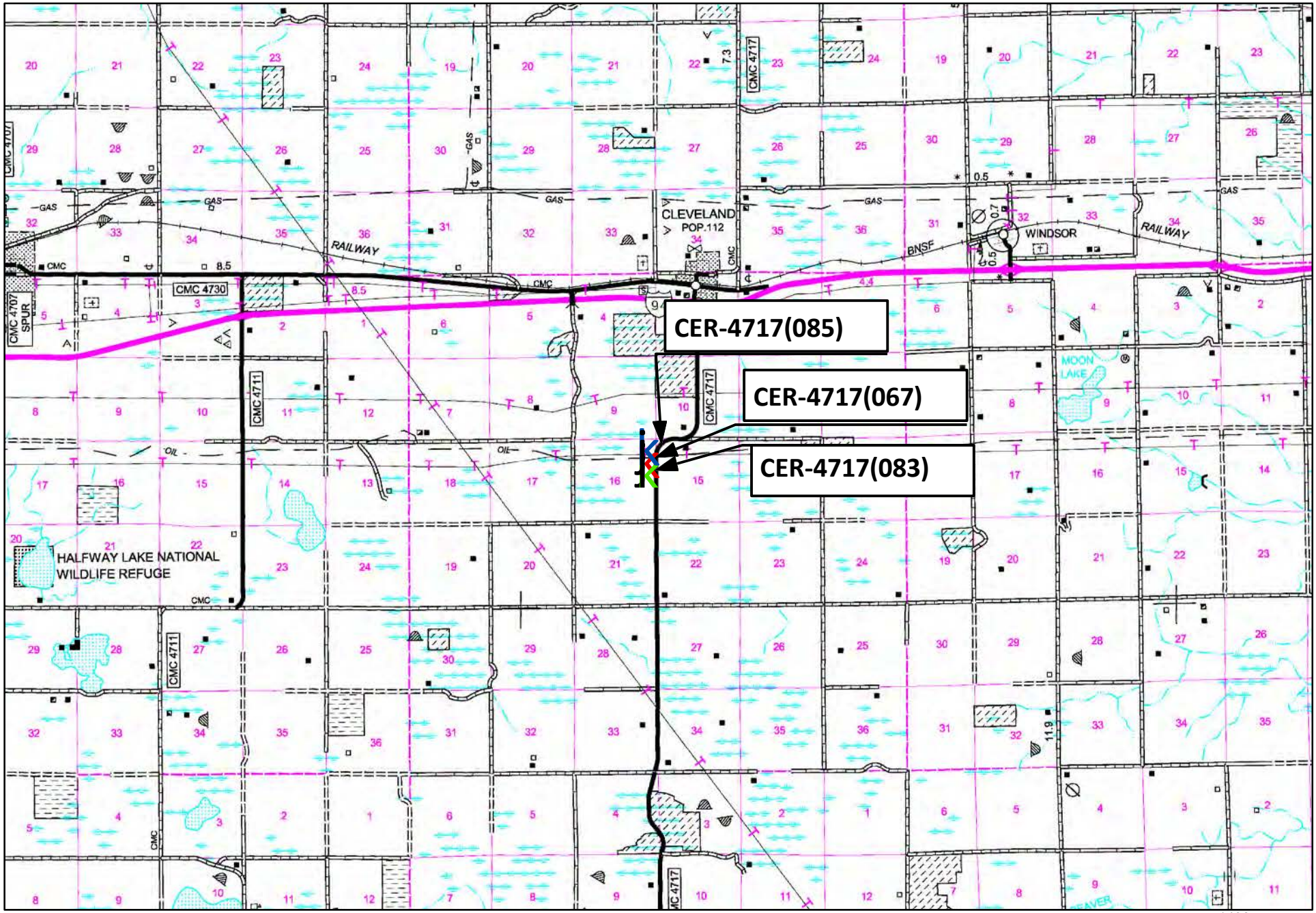
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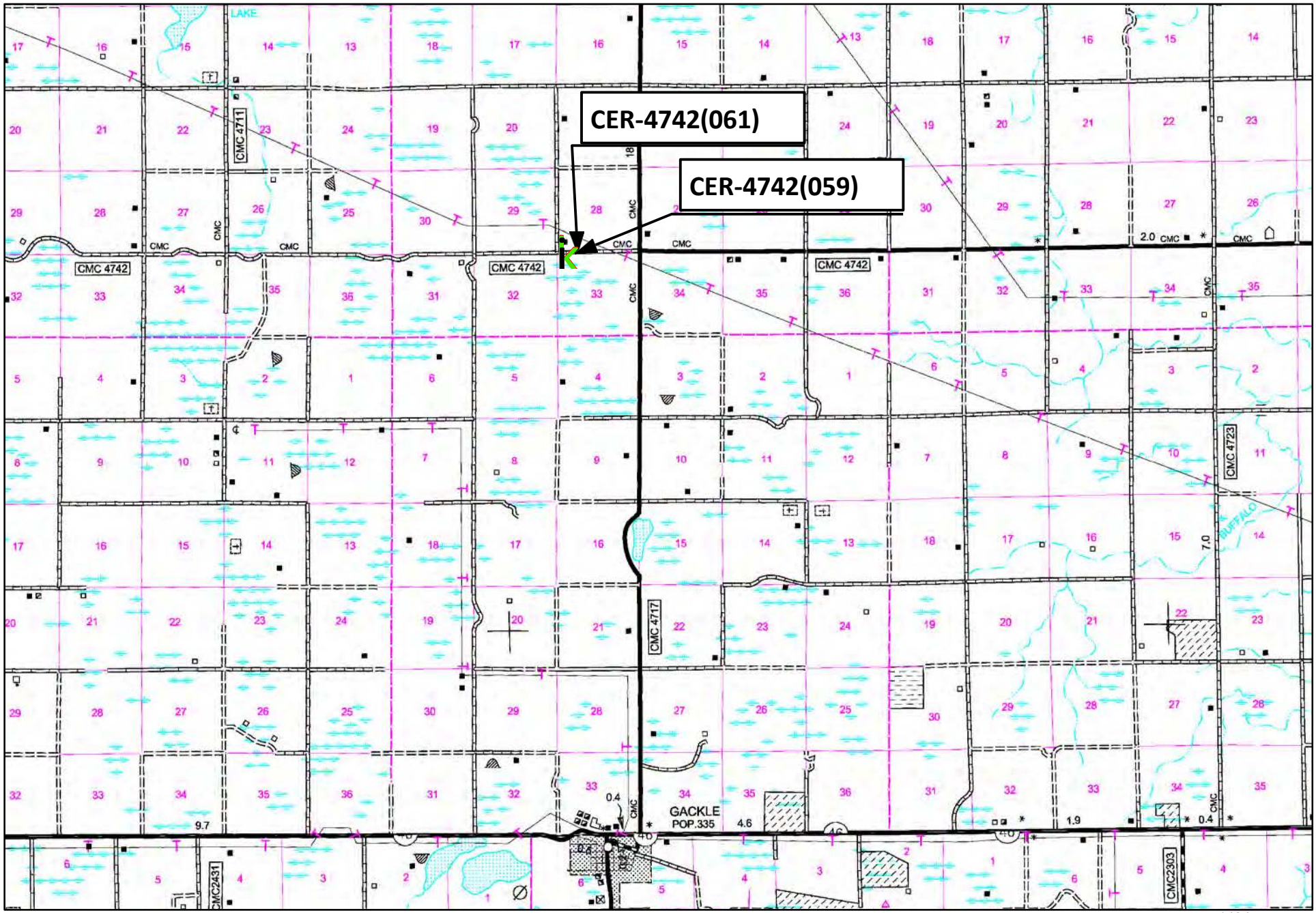
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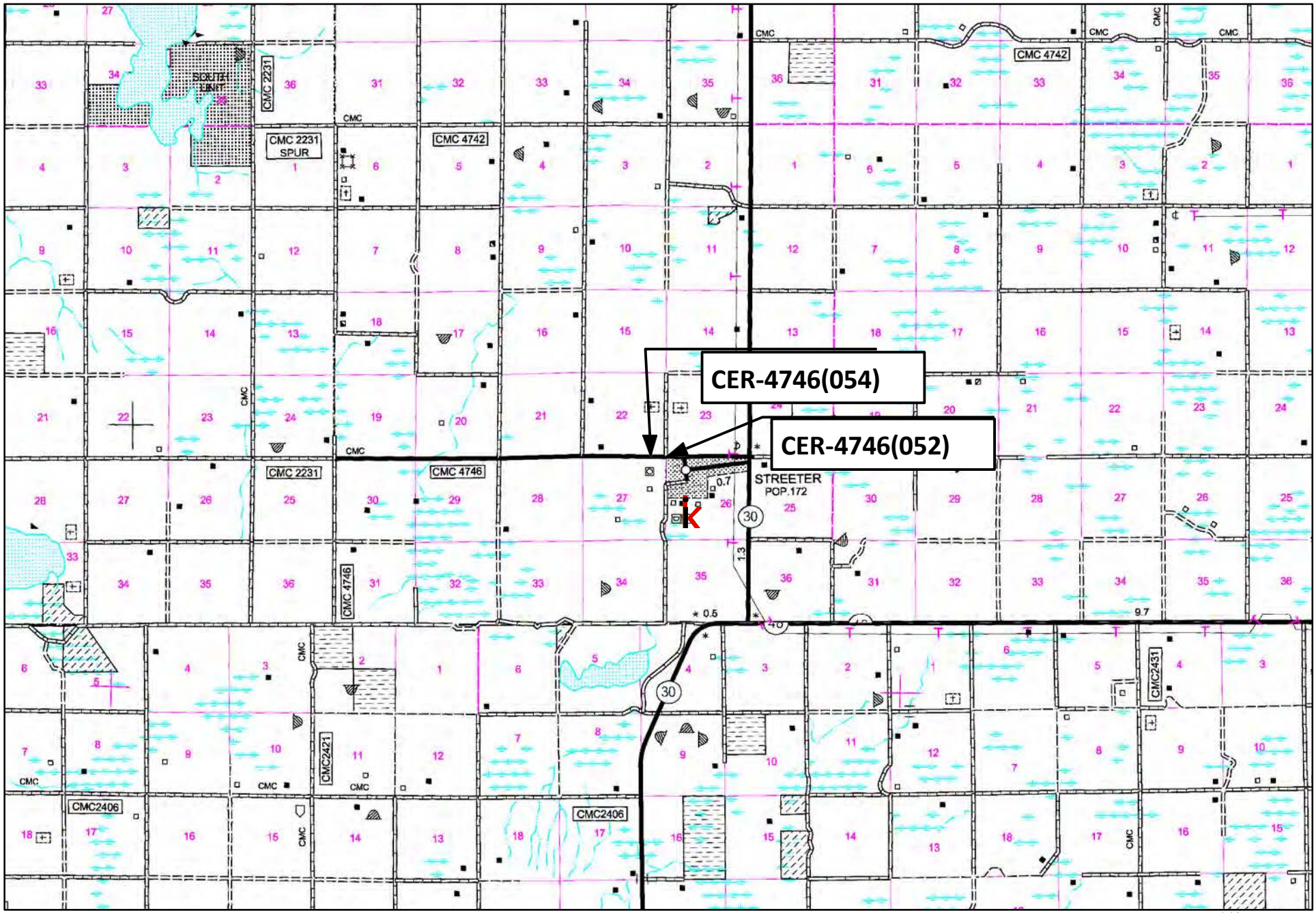
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30
CMC

E

E.1.19 Grade Raising Projects from Repeated Emergencies

Facilities Repeatedly Damaged by Emergency Events Summary

In accordance with 23 CFR 667, NDDOT conducted statewide evaluations where applicable on facilities that were repeatedly damaged on two or more occasions. NDDOT took reasonable actions to determine the locations and corrective actions that occurred at each location based on the data we had. We also received data from the ND FHWA Division office in determining past authorization of Emergency Relief projects within the state.

23 CFR 667 requires states to evaluate these locations back to January 1, 1997. Data prior to 2009 related to the exact damage and location is very limited. NDDOT used an existing database and information provided by the ND FHWA Division office in compiling this information.

NDDOT determined there had been 19 locations where facilities not on the NHS that were repeatedly damaged by two or more emergency events. NDDOT mapped these locations based on the data we had and grouped sites in close proximity to each other. Locations that were fairly close or overlapped based on the permanent repairs that were completed, were considered “a location or group” where an evaluation was considered necessary.
Based on the evaluations conducted related to the NHS sites, NDDOT has either mitigated or minimized the chance of damage reoccurring again at these locations. NDDOT has prepared a report of these locations.

Group Site Name: I-29
Highway: I-29 ***Location (RP, LAT/LON, or SEC/TWP/R):*** I-29, Grand Forks & Walsh Counties, RP 158 to RP 172
Owner: State ***NHS (yes/no):*** Yes
Event Years: 1997, 2009, 2011
Description of damage:
1997: High water damage right of way fence along I-29.
2009: Due to high water and sheet ice flow, numerous right of way fence was destroyed. Some ditch blocks and median blocks were damaged. There were large debris deposits within I-29 right of way.
2011: Debris from the recent flood were deposited within the I-29 right of way. The debris consists of timber, branches, grass & field organic materials, and other man-made materials.
Completed Permanent Repairs:
1997: SER-6-029(038)161: Repair and replace right of way fence.
2009: SER-6-029(090)161: Repair and replace right of way fence. Clear debris from clear zones and right of way. Restoration of ditch blocks and median blocks to maintain positive drainage within the right of way.
2011: SER-6-029(114)158: For safety of mowing and the traveling public, the debris shall be removed from within the limits of the right-of-way and any easements. The debris removal will include materials caught by the right-of-way fencing that runs along Interstate.

Evaluation:
Because of the geography of this area, much of the farmland adjacent to I-29 is inundated with flood water when the Red River floods. Debris and ice sheets become tangled in the right of way fence and deposited within the I-29 right of way. Damage to the roadway is generally considered minor, but fencing repairs and debris clean up would be required with major flooding events. I-29 is located within a floodway and replacing fencing is cost effective compared to raising this corridor. As this corridor is in a floodway, raising the corridor would increase localized flooding resulting in additional damage to other facilities or communities adjacent to this corridor.
Group Site Name: ND 13
Highway: ND 13 ***Location (RP, LAT/LON, or SEC/TWP/R):*** ND 13, west of Lehr, McIntosh County, RP 240 to RP 242.5
Owner: State ***NHS (yes/no):*** Yes
Event Years: 1999, 2010 ***Description of damage:***
1999: Erosion due to high water and wave action.
2010: During planned reconstruction project, substantial rise in water elevation overtopped the roadway in the closed basin.
Completed Permanent Repairs:
1999: SER-SNH-2-013(016)241: Riprap placed to prevent further erosion from wave action.
1999: SER-SNH-2-013(017)242: Riprap placed to prevent further erosion from wave action.
2010: SER-NH-2-013(027)233: A grade raise was completed above 25-year event in a closed drainage basin and flatten inslopes to prevent erosion.
2010: SER-2-013(041)241: Hot bituminous surfacing for the temporary gravel grade raise project SER-2-013(040)241 that was constructed earlier in the year.
Evaluation:
The permanent grade raise for the 2010 event has maintained safe travelling conditions and protected the roadway from further damage. The permanent grade raise increased the roadway profile above the 25-year event in this closed basin. The hydraulic analysis from 2010 did not specify the natural outlet elevation of the closed basin at this site. The site will continue to be monitored for any impacts to the roadway as the water level fluctuates over time.

Group Site Name: ND 11 - 1
Highway: ND 11
Location (RP, LAT/LON, or SEC/TWP/R): ND 11, Emmons County, west of Hague, RP 2
Owner: State
NHS (yes/no): No
Event Years: 1997, 2010
Description of damage:
1997: High water threatened to inundate the roadway and caused erosion to the inslope.

2010: Unforeseen high water and high winds created wave action that washed away riprap and eroded the north inslope into the clear zone threatening the roadway.
Completed Permanent Repairs:
1997: SER-1-011(004)002: Install and relay erosion pads.
2010: SER-1-011(007)002: The north inslope was reshaped to the original cross-section with borrow material. Fabric and riprap were replaced to protect the inslope.
Evaluation:
The past events at this site have caused damage to the inslope of the roadway. The repairs completed at this site have restored the inslope and provided appropriate erosion protection from further damage by restoring the erosion pads and riprap. No more damage is foreseen at this site with the current erosion control measures in place.

Group Site Name: ND 11 - 2
Highway: ND 11
Location (RP, LAT/LON, or SEC/TWP/R): ND 11, McIntosh County, east of Ashley, RP 41
Owner: State
NHS (yes/no): No
Event Years: 1997, 2011

Description of damage:
1997: Roadway inundated by water in a closed basin.
2011: Roadway inundated by water in a closed basin.
Completed Permanent Repairs:
1997: SER-2-011(014)041: Permanent grade raise, culvert extension, aggregate base, hot bituminous pavement, and riprap.
2011: SER-2-011(029)041: A permanent grade raise, 5’ plus applicable freeboard, was constructed to keep the driving surface out of the water and maintain a safe travel condition. The centerline elevation for the top of the pavement is 1936’.
Evaluation:
The permanent grade raise for the 2011 event has maintained safe travelling conditions and protected the roadway from further damage. Currently the roadway is over 10’ below the natural outlet elevation of 1948’ for the closed basin at this site. Prior to reaching the natural outlet elevation of the closed basin, water will move into other sloughs through outlets at lower elevations. The site will continue to be monitored for any impacts to the roadway as the water level fluctuates over time.

Group Site Name: ND 30
Highway: ND 30
Location (RP, LAT/LON, or SEC/TWP/R): ND 30, Logan County, north of Lehr, RP 0 to RP 1

Owner: State
NHS (yes/no): No
Event Years: 1999, 2011
Description of damage:
1999: Erosion of roadway inslope.
2011: Roadway inundated by water in a closed basin.
Completed Permanent Repairs:
1999: SER-2-030(005)001: Riprap.
2011: SER-2-030(016)000: A permanent grade raise, 5’ plus applicable freeboard, was constructed to keep the driving surface out of the water and maintain a safe travel condition. The centerline elevation for the top of the pavement is 1984.5’.
Evaluation:
The permanent grade raise for the 2011 event and the riprap repair for the 1999 event has maintained safe travelling conditions and protected the roadway from further damage. Currently the roadway is nearly 4’ below the natural outlet elevation of 1988.1’ for the closed basin at this site. The site will continue to be monitored for any impacts to the roadway as the water level fluctuates over time.

Group Site Name: ND 34 - 1
Highway: ND 34
Location (RP, LAT/LON, or SEC/TWP/R): ND 34, Logan County, west of Napoleon, RP 25
Owner: State
NHS (yes/no): No
Event Years: 1997, 2010
Description of damage:
1997: High water impacted the roadway.
2010: High water and high winds impacted the entire inslope. Wave action undermined the in place concrete erosion blanket and destroyed the integrity of the inslope.
Completed Permanent Repairs:
1999: SER-1-034(007)025: Reinforced concrete box and reset concrete erosion blankets.
2010: SER-1-034(017)025: Removed all material from the inslope, reshaped the inslope with gravel class 3 material, and then placed a new concrete erosion blanket. A riprap berm was constructed to act as a wave breaker during high winds.
Evaluation:
The past events at this site have caused damage to the inslope of the roadway. The repairs completed at this site have restored the inslope and provided appropriate erosion protection from further damage by restoring the erosion pads and riprap. No more damage is foreseen at this site with the current erosion control measures in place.

Group Site Name: ND 34 - 2
Highway: ND 34
Location (RP, LAT/LON, or SEC/TWP/R): ND 34, Logan County, east of junction with ND 30, RP 49
Owner: State
NHS (yes/no): No
Event Years: 1997, 2020
Description of damage:
1997: High water has inundated the roadway.
2020: Roadway inundated by water in a defined basin.
Completed Permanent Repairs:
1997: SER-2-034(003)049: Permanent grade raise, aggregate base, and riprap.
2020: SERP-2-034(007)049: A 5' permanent grade raise will be constructed to keep the driving surface out of the water and maintain a safe travel condition. The finished subgrade elevation is expected to be 1863.14'.
Evaluation:
The permanent grade raise for the 2020 event will maintain safe travelling conditions, provide adequate clear zone, and protect the roadway from further damage once it is constructed. After the permanent grade raise is completed for the 2020 event, the roadway will be over 20' below the natural outlet elevation of 1887' for the defined basin at this site. The site will continue to be monitored for any impacts to the roadway as the water level fluctuates over time.

Group Site Name: ND 36
Highway: ND 36
Location (RP, LAT/LON, or SEC/TWP/R): ND 36, Kidder County, east of Robinson,
RP 53 to RP 54
Owner: State
NHS (yes/no): No
Event Years: 1997, 1999, 2020
Description of damage:
1997: Damage to the roadway inslope.
1999: High water and flooding of roadway.
2020: Erosion and pavement damaged by water in a closed basin.
Completed Permanent Repairs:
1997: SER-1-036(011)053: Erosion pads.
1999: SER-1-036(013)053: Channel construction.
1999: SS- SER-1-036(014)053: Permanent grade raise.

2020: SERP-1-036(032)054: ER eligible work at this site consists of widening with riprap and concrete erosion blankets. A grade raise betterment has been approved. The betterment is a 5’ permanent grade raise would be constructed to keep the driving surface out of the water and maintain a safe travel condition. The finished subgrade elevation would expect to be 1770.1’.

Evaluation:
A betterment was approved to construct a permanent grade raise rather than the ER eligible widening with riprap and concrete erosion blankets. Widening with riprap and concrete erosion blankets would be effective against erosion if waters do not rise. Rising water elevations could cause damage to the roadway. A grade raise is a more resilient option that would help prevent loss of use due to future rising waters in the closed basin. If the grade raise is constructed for the 2020 event, the roadway would be nearly 4’ below the natural outlet elevation of 1774’ for the closed basin at this site. The site will continue to be monitored for any impacts to the roadway as the water level fluctuates over time.

Group Site Name: ND 46 - 1
Highway: ND 46
Location (RP, LAT/LON, or SEC/TWP/R): ND 46, Logan & Stutsman Counties,
near Gackle, RP 6
Owner: State
NHS (yes/no): No
Event Years: 2009, 2019
Description of damage:
2009: Major state highway inundated by trapped water runoff.
2019: Roadway inundated by water in a defined basin.
Completed Permanent Repairs:
2009: SER-2-046(031)006: A 5’ permanent grade raise was constructed to keep the driving surface out of the water and maintain a safe travel condition. The elevation for the top of the pavement was 1893.4’.
2019: SERP-2-046(051)006: A permanent grade raise will be constructed 5’ higher than the existing water surface to keep the driving surface out of the water and maintain a safe travel condition. The finished subgrade elevation is expected to be 1899.51’.
Evaluation:
The permanent grade raise for the 2019 event will maintain safe travelling conditions, provide adequate clear zone, and protect the roadway from further damage once it is constructed. After the permanent grade raise is completed for the 2019 event, the roadway will be over 10’ below the natural outlet elevation of 1912’ for the defined basin at this site. Prior to reaching the natural outlet elevation of the defined basin, water will move into another slough through an outlet at a lower elevation. The site will continue to be monitored for any impacts to the roadway as the water level fluctuates over time.

Group Site Name: ND 46 - 2
Highway: ND 46
Location (RP, LAT/LON, or SEC/TWP/R): ND 46, Logan County, west of Gackle, RP 8 to RP 9
Owner: State
NHS (yes/no): No
Event Years: 2011, 2020
Description of damage:
2011: Roadway inundated by water in a defined basin.
2020: Roadway inundated by water in a defined basin.
Completed Permanent Repairs:
2011: SER-2-046(038)008: A 9.5' permanent grade raise was constructed to keep the driving surface out of the water and maintain a safe travel condition from RP 8.6 to RP 9.2. The elevation for the top of the pavement was 1905.3'.

2020: SERP-2-046(053)008: A permanent grade raise, approximately 8.25', will be constructed from RP 8.0 to RP 8.6 to keep the driving surface out of the water, maintain a safe travel condition, and match the elevation of the grade raise constructed for the 2011 event. The finished subgrade elevation is expected to be 1904.5'. The elevation for the top of the pavement is expected to be 1905.3'.
Evaluation:
The permanent grade raise for the 2020 event will be like the repairs from the 2011 event and maintain safe travelling conditions, provide adequate clear zone, and protect the roadway from further damage once it is constructed. After the permanent grade raise is completed for the 2020 event, the roadway will be nearly 15' below the natural outlet elevation of 1920' for the defined basin at this site. The site will continue to be monitored for any impacts to the roadway as the water level fluctuates over time.

Group Site Name: ND 56
Highway: ND 56
Location (RP, LAT/LON, or SEC/TWP/R): ND 56, Logan County, south of Gackle,
RP 46 to RP 50
Owner: State
NHS (yes/no): No
Event Years: 1997, 2010, 2020
Description of damage:
1997: High water inundated the roadway.
2010: Highway inundated with water overtopping the roadway.
2020: Roadway inundated by water in a defined basin.
Completed Permanent Repairs:

1997: SER-2-056(015)046: Permanent grade raise, aggregate base, and riprap.
1997: SER-2-056(019)046: Hot bituminous pavement from RP 46 to RP 50.
2010: SER-2-056(025)048: A 4.1' permanent grade raise above the existing water elevation was constructed to keep the driving surface out of the water and maintain a safe travel condition. The centerline elevation for the top of the pavement was 1895.8'.
2020: SERP-2-056(032)048: A permanent grade raise, approximately 9.5', will be constructed to keep the driving surface out of the water and maintain a safe travel condition. The elevation will match the permanent grade raises on ND 46 from RP 8.0 to RP 9.2, since the sloughs at these sites are connected. The finished subgrade elevation is expected to be 1904.5'.

Evaluation:

The sloughs at this site are connected to the slough at the site of ND 46 from RP 8.0 to RP 9.2. The permanent grade raise for the 2020 event will be like the permanent grade raise on ND 46 and maintain safe travelling conditions, provide adequate clear zone, and protect the roadway from further damage once it is constructed. After the permanent grade raise is completed for the 2020 event, the roadway will be nearly 15' below the natural outlet elevation of 1920' for the defined basin at this site. Prior to reaching the natural outlet elevation of the defined basin, water will move into another slough through an outlet at a lower elevation. The site will continue to be monitored for any impacts to the roadway as the water level fluctuates over time.

Group Site Name: Kidder County
Highway: CMC 2215 ***Location (RP, LAT/LON, or SEC/TWP/R):*** 1.5 Miles west and 3 Miles south of Robinson
Owner: County ***NHS (yes/no):*** No
Event Years: 2014, 2019
Description of damage:
2014: Roadway inundated by water in a defined basin.
2019: Roadway inundated by water in a defined basin.
Completed Permanent Repairs:
2014: CER-CNOC-2215(058)
• 3' permanent grade raise, HBP, rip rap, completed in 2017.
2019: CER-2215(059)
• A permanent grade raise is planned for construction in 2022 that will raise the centerline subgrade elevation to 2' above the outlet elevation.

Evaluation:

Once the permanent grade raise is completed to the ultimate elevation the site will no longer be threatened by inundation. The permanent grade raise will maintain safe travelling conditions, provide adequate clear zone, and protect the roadway from further damage.

Group Site Name: Logan County
Highway: CMC 2406 ***Location (RP, LAT/LON, or SEC/TWP/R):*** 4 mi N & 2.5 mi E of Napoleon

Owner: County ***NHS (yes/no):*** No
Event Years: 2011, 2020
Description of damage:
2014: Roadway inundated by water in a defined basin.
2019: Roadway inundated by water in a defined basin.
Completed Permanent Repairs:
2011: CER-2431(053)
• 2’ emergency grade raise, permanent work was widening and riprap
2019: CER-2431(060)
• A permanent grade raise is planned for construction in 2022 that will raise the centerline subgrade elevation to 2’ above the outlet elevation.
Evaluation:
Once the permanent grade raise is completed to the ultimate elevation the site will no longer be threatened by inundation. The permanent grade raise will maintain safe travelling conditions, provide adequate clear zone, and protect the roadway from further damage.

Group Site Name: Sargent
Highway: CMC 4110 & 4135 ***Location (RP, LAT/LON, or SEC/TWP/R):*** 6.5 miles north of Geneseo
Owner: County ***NHS (yes/no):*** No
Event Years: 2010, 2011 ***Description of damage:***
2010: Roadway inundated
2011: Roadway damaged by flowing water
Completed Permanent Repairs:
2010: CER-4110(058), CER-4110(059) & CER-4135(054)
• Permanent work consisted of grade raises at three sites along with inslope protection.
2011: CER-4110(064)
• Permanent work consisted of replacing riprap at the end of a pipe that was damage by high flows.
Evaluation:
Sites were damaged by flooding Wild Rice river. The grade raise, inslope protection, and culvert protections are anticipated to prevent any future damage at these locations.

Group Site Name: Stutsman 1
Highway: CMC 4711 ***Location (RP, LAT/LON, or SEC/TWP/R):*** 7 miles S of I-94

Owner: County ***NHS (yes/no):*** No
Event Years: 2010, 2011
Description of damage:
2009: Roadway inundated
2011: Roadway inundated
Completed Permanent Repairs:
2009: CER-4711(051)
• Permanent work consisted of 2’ grade raise with inslope protection.
2011: CER-4711(052)
• 2’ Emergency Grade Raise. Permanent work consisted of widening to flatten inslopes and installing inslope protection. County elected to not complete permanent grade raise due to funding constraints.
Evaluation:
Site is still vulnerable inundation if the water elevation rises due to a future event. The roadway currently provides safe travelling conditions, provides adequate clear zone, and the inslope is protected at the current water level.

Group Site Name: Stutsman 2
Highway: CMC 4717 ***Location (RP, LAT/LON, or SEC/TWP/R):*** 5.7 Miles N of Gackle
Owner: County ***NHS (yes/no):*** No
Event Years: 1997, 2011
Description of damage:
1997: Roadway inundated
2011: Roadway inundated
Completed Permanent Repairs:
1997: CER-4717(054)
• Permanent work consisted of 2’ grade raise, inslope protection, and HBP.
2011: CER-4711(088)
• Permanent work consisted of 3.6’ grade raise, inslope protection and HBP. The consultant was not able to determine a reasonable ultimate elevation, so the grade was raised to accommodate the storage required for a 100-year storm event plus two feet of freeboard.
Evaluation:
The site is still vulnerable to inundation if the water elevation rises due to a future event. The roadway currently provides safe travelling conditions, provides adequate clear zone, and the inslope is protected at the current water level.

Group Site Name: Stutsman 3
Highway: CMC 4717 ***Location (RP, LAT/LON, or SEC/TWP/R):*** 3 mi N of Gackle
Owner: County ***NHS (yes/no):*** No
Event Years: 2007, 2011
Description of damage:
2007: Roadway inundated
2011: Roadway inundated
Completed Permanent Repairs:
2007: CER-4717(062) & CER-4717(064)
• Permanent work consisted of 2' grade raise, inslope protection. HBP was planned as permanent work, but never completed due to continuous flooding.
2011: CER-4711(090)

• Permanent work consisted of 3.1' grade raise, inslope protection and HBP. The County elected not to raise the grade to the ultimate elevation or realign the road due to funding constraints. The grade was raised to accommodate three years of storage plus two feet of freeboard.
Evaluation:
The site is still vulnerable to inundation if the water elevation rises due to a future event. The roadway currently provides safe travelling conditions, provides adequate clear zone, and the inslope is protected at the current water level.

Group Site Name: Stutsman 4
Highway: CMC 4717 ***Location (RP, LAT/LON, or SEC/TWP/R):*** 2 mi S of Cleveland
Owner: County ***NHS (yes/no):*** No
Event Years: 2009, 2011 ***Description of damage:***
2009: Roadway inundated
2011: Roadway inundated
Completed Permanent Repairs:
2009: CER-4717(067) & CER-4717(083)
• Permanent work consisted of 2' grade raise, inslope protection. HBP was done as separate project in 2012.
2011: CER-4711(085)

• Permanent work consisted of 3.5’ grade raise, inslope protection and HBP. The County elected not to raise to the grade to the ultimate elevation or realign the road due to funding constraints. The grade was raised to accommodate three years of storage plus two feet of freeboard.

Evaluation:

The site is still vulnerable to inundation if the water elevation rises due to a future event. The roadway currently provides safe travelling conditions, provides adequate clear zone, and the inslope is protected at the current water level.

Group Site Name: Stutsman 5
Highway: CMC 4742 ***Location (RP, LAT/LON, or SEC/TWP/R):*** 7 mi N of Gackle
Owner: County ***NHS (yes/no):*** No
Event Years: 2009, 2011
Description of damage:
2009: Roadway inundated
2011: Roadway inundated
Completed Permanent Repairs:
2007: CER-4742(059)
• Permanent work consisted of 2’ grade raise, inslope protection and aggregate surfacing.
2011: CER-4742(061)
• Permanent work consisted of 2’ grade raise, inslope protection and aggregate surfacing. Since this is a gravel road a hydraulic analysis was not completed, and the county elected to raise the grade 2’ and not investigate realignment or raising the grade above the ultimate elevation.

Evaluation:

The site is still vulnerable to inundation if the water elevation rises due to a future event. The roadway currently provides safe travelling conditions, provides adequate clear zone, and the inslope is protected at the current water level.

Group Site Name: Stutsman 6
Highway: CMC 4746 ***Location (RP, LAT/LON, or SEC/TWP/R):*** 7 mi N of Gackle
Owner: County ***NHS (yes/no):*** No
Event Years: 1997, 2011
Description of damage:

1997: Roadway inundated
2011: Roadway inundated

Completed Permanent Repairs:

1997: CER-4746(052) • Permanent work consisted of 2' grade raise, inslope protection and aggregate surfacing.
2011: CER-4742(054) • Permanent work consisted of salvaging riprap from emergency grade raise, widening and flattening inslope, and reinstalling inslope protection and aggregate surfacing. The county elected not to complete the permanent grade raise. In 2019, this site was again inundated. The County elected not to pursue this as an ER site and are considering locally funded options.

Evaluation:

The site is still vulnerable to inundation if the water elevation rises due to a future event.

Source: North Dakota Department of Transportation, Maintenance Division, 2023

E.1.10 Changes in Population and Vulnerability Assessment

County	Total Events	Total Deaths	Total Injuries	Total Damages	2020	2040	Percent Change
Adams	4	0	0	$234,000	2,368	2,081	-12.1%
Barnes	31	0	3	$4,655,000	11,062	10,259	-7.3%
Benson	66	0	0	$74,928,000	7,322	9,018	23.2%
Billings	6	0	0	$140,000	987	1,217	23.3%
Bottineau	16	0	0	$2,156,000	6,768	6,627	-2.1%
Bowman	4	0	0	$637,000	3,367	3,603	7.0%
Burke	3	0	0	$180,000	2,481	3,106	25.2%
Burleigh	32	0	0	$23,508,000	97,770	114,018	16.6%
Cass	80	1	0	$396,969,500	182,259	232,293	27.5%
Cavalier	23	0	0	$1,849,500	3,771	3,344	-11.3%
Dickey	13	0	0	$2,419,000	5,027	4,542	-9.6%
Divide	2	0	0	$398,000	2,510	2,954	17.7%
Dunn	13	0	0	$2,805,000	4,882	6,431	31.7%
Eddy	26	0	0	$242,000	2,299	2,296	-0.1%
Emmons	9	0	0	$1,743,000	3,324	2,978	-10.4%

County	Total Events	Total Deaths	Total Injuries	Total Damages	2020	2040	Percent Change
Foster	7	0	0	$1,735,000	3,336	3,291	-1.3%
Golden Valley	6	0	0	$140,000	1,924	2,176	13.1%
Grand Forks	76	3	0	$3,068,204,000	74,366	89,398	20.2%
Grant	10	0	0	$742,000	2,392	2,286	-4.4%
Griggs	20	0	0	$425,000	2,222	1,743	-21.6%
Hettinger	9	2	0	$1,173,000	2,713	3,022	11.4%
Kidder	8	0	0	$1,850,000	2,453	2,209	-9.9%
La Moure	12	2	0	$3,784,000	4,106	3,872	-5.7%
Logan	6	0	0	$540,000	1,912	1,935	1.2%
McHenry	17	0	0	$5,650,000	6,125	6,848	11.8%
McIntosh	4	0	0	$352,000	2,603	2,101	-19.3%
McKenzie	8	0	0	$5,694,000	14,586	26,683	82.9%
McLean	12	0	0	$5,990,000	9,894	10,570	6.8%
Mercer	12	0	1	$5,686,000	8,930	8,675	-2.9%
Morton	21	0	0	$13,963,000	31,621	36,254	14.7%
Mountrail	16	0	0	$1,131,000	11,210	16,103	43.6%
Nelson	60	0	0	$33,715,500	2,861	2,330	-18.6%
Oliver	11	0	0	$742,000	1,902	1,931	1.5%
Pembina	58	0	0	$16,372,000	6,974	5,829	-16.4%
Pierce	4	0	0	$296,000	4,243	4,040	-4.8%
Ramsey	62	0	1	$129,615,500	11,838	11,695	-1.2%
Ransom	44	1	0	$1,328,000	5,438	5,180	-4.7%
Renville	11	0	0	$6,311,000	2,595	2,674	3.0%
Richland	81	0	0	$80,745,500	16,540	16,241	-1.8%
Rolette	13	1	0	$683,000	15,629	18,641	19.3%
Sargent	45	0	0	$745,000	3,899	3,740	-4.1%

County	Total Events	Total Deaths	Total Injuries	Total Damages	2020	2040	Percent Change
Sheridan	2	0	0	$450,000	1,292	1,114	-13.8%
Sioux	14	2	2	$1,921,000	4,748	6,231	31.2%
Slope	1	0	0	$100,000	796	801	0.6%
Stark	7	0	0	$1,320,000	34,170	45,825	34.1%
Steele	29	0	0	$12,000,000	1,942	1,843	-5.1%
Stutsman	22	0	0	$2,565,000	21,224	20,197	-4.8%
Towner	22	0	0	$130,000	2,258	2,236	-1.0%
Traill	36	0	0	$22,602,500	8,029	7,714	-3.9%
Walsh	56	1	0	$17,961,000	10,975	10,470	-4.6%
Ward	25	0	0	$108,585,000	76,184	94,378	23.9%
Wells	17	0	0	$4,289,000	4,028	3,641	-9.6%
Williams	12	0	0	$2,095,000	39,380	63,505	61.3%

Source: NCEI, 2023; U.S. Census Bureau, 2020

Incident 09-003, Spring Flooding

SEOC After Action Review Executive Summary January 15, 2009

During the summer and fall of 2009, the Operations and Planning staff of the N.D Department of Emergency Services (NDDES), Division of Homeland Security (NDHLS), coordinated with state agencies to conduct after action reviews for Incident 09-003, Spring Flooding.

Prior to spring, many river basins experienced record level snow fall and greater than 500% normal snow depth which contributed to prolonged catastrophic flooding statewide that occurred early March and extended into June. This complex incident required a massive response effort from private, voluntary, local, state and federal agencies whose personnel demonstrated ingenuity and dedication when addressing simultaneous flood issues in multiple locations. The largest state agency response since the 1997 flood occurred as the SEOC functioned at Level 1, 24/7 operations, for 37 days and coordinated over 600 requests for assistance. At one point, more than 800 federal personnel responded in support of flood-fighting efforts. Blizzard conditions, multiple river crests, road closures and overwhelming requests for assistance, which stressed staffing levels and resources, compounded flight fight difficulties resulting which stressed staffing levels and impeded resource delivery. The magnitude of the event required the State Emergency Operations Center (SEOC) to secure additional resources through the Emergency Management Assistance Compact (EMAC), signifying the first event in which this agreement was utilized to obtain assistance.

Even with the enormous size and complexity of this event, state agencies commented overall response was effective and well-coordinated through use of the SEOC Unified Command System, which has been cited on the federal level as a best practice. However, agencies did identify a series of improvements to implement.

The following is a summary of state agency after action comments by Target Capability:

Target Capability: Planning

Preparedness Measures

In advance of flooding, the State Emergency Operations Center (SEOC) staff proactively developed and refined planning products to help local, tribal, and state officials assess flood threats. Staff solicited the National Weather Service (NWS) for its hydrologic outlooks and held a meeting with state agencies assigned responsibility in the Flood Incident Annex of the State Emergency Operations Plan

(SEOP). Additional preparedness meetings were also conducted with agencies regarding issues such as sheltering, carcass disposal and medical needs. Exercises were conducted on the state and local levels to identify sustainments and shortfalls.

NDDES issued a Response Alert Notification (RAN) to state agencies to begin preparations for the flood potential flooding. Based on flood forecasts, agencies such as the N.D. Department of Health (NDDoH), N.D. National Guard (NDNG) and N.D. Department of Transportation (NDDOT), subsequently held departmental meetings to review plans, assess resources, critical infrastructure and facilities, as well as pre-position equipment to enhance preparedness.

Agencies such as NDDOT began steps to improve capability by ensuring flood threat assessments were shared and preparing staff to operate remotely through Government Emergency Telecommunication Services (GETS) cards and Wi-Fi cards.

The N.D. State Water Commission (NDSWC) personnel believe jurisdictions subjected to repeated flooding prepared well for the event while those less accustomed to flooding were not as prepared. The state needs to expand efforts to identify potential flood concerns for all river basins in the state. The NDSWC plans to do more snow depth surveys to include all regions of the state. State agencies also recognized the need to coordinate with local and tribal governments prior to the event regarding flood potential, level of preparedness and resource gaps.

Advance Planning

While identifying potential areas of need and resources has always been an integral part of SEOC operations, the spring flood represented the first formalized implementation of an Advance Planning Unit of the Planning Section. The team coordinated efforts with other state and federal agencies to identify needs and resources in support of local and tribal government.

Advance plan development initially focused on a wide spectrum of initiatives and become more manageable once directed to concentrate efforts on large-scale evacuation and sheltering. After reviewing the Evacuation, Sheltering and Mass Care Annex of the State Emergency Operations Plan and emergency operations plans of the most seriously affected counties, a meeting of lead and support agencies was held to begin development of state-support evacuation and sheltering plans for Fargo, Jamestown, Valley City, Pembina, Lisbon, and LaMoure. Daily meetings with the NWS and NDSWC proved critical in assisting the Advance Planning Unit identify potential threats and approximate timelines.

Because the application of advance planning was new to SEOC operations, emergency managers were unfamiliar with the state's intent as well as the importance of conducting local advance planning efforts. The Red River Valley evacuation planning effort pointed to a strong need to improve local-state communication and coordination. State agencies and local officials were not always apprising one another of planning efforts. In some instances, facilities were committed without coordination with the facility manager and for multiple functions. As an example, Central Cass school had been identified by the county as a shelter, by N.D. Department of Human Services (NDDHS) as a shelter, and by NDDoH as a medical needs shelter. Cass County officials were taken by surprise when a Type II Incident Management Team arrived virtually overnight in Casselton.

Better coordination with local emergency managers regarding the state's intent for securing buses would have alleviated problems that occurred when the state contracted all the Fargo buses.

State agencies recommended the continuation of "ground truthing" to validate plans and ensure local-state plans are in sync. During the flood, N.D. Forest Service (NDFS) personnel conducted on-site assessments to assist the Advance Planning team identify locations for staging resources as well as potential shelters. One agency commented participants need to complete their "homework" in advance of meetings. Planning efforts were stymied by the Health Insurance Portability and Accountability Act (HIPAA); agencies could not share information about clients, which made it difficult to identify redundancies.

Advanced planning efforts were an integral part of the SEOC response. It is recommended advanced planning efforts commence as soon as a threat is identified in order to assess areas most likely affected and predict potential impacts. NDDHS officials suggested state agencies meet with at-risk jurisdictions to assess evacuation/sheltering/mass care plans and identify shortfalls that may occur and where state and other outside support is needed.

In summary, weaknesses resulted from a lack of communications among and between state, local, and federal agencies regarding actions they were taking. Agencies representing all three levels of government did not always communicate operational information to the SEOC Operations Section Chief.

Target Capability: EOC Management

Use of the Unified Command System (UCS)

Jurisdictions whose responders worked well together implemented UCS for a coordinated response. Failure to implement UCS resulted in a disjointed response by some jurisdictions that lacked leadership or familiarity with ICS roles and responsibilities. Responding state agencies commented communication and working relationships among and between the public and local officials in one community created turmoil which proved counter-productive for responders

Public works personnel provide support to fire, emergency medical services and law enforcement responders during emergency situations. Consequently one NDDES regional coordinator stated although the emergency was largely a public works emergency public works personnel were overlooked as a potential incident commanders and not included in the local ICS structure. Public works personnel are trained in ICS and need to be accorded equal status with other responding agencies.

Regional coordinators and emergency managers were directed by the SEOC to serve as liaisons to support operations and help establish and/or refine the application of UCS. This deployment of support was well received and helped streamline chain of command issues and improved response efficiency.

The Civil Air Patrol (CAP) used Area Command to organize its response, which allowed members to remain close to home. CAP's application of Area Command provided for a cohesive response.

The large scale 2009 Spring Flood often overwhelmed local incident management capabilities. A Type II Incident Management Assistance Team (IMAT) was brought into Casselton to manage and coordinate state support in response to evacuations of Fargo. In addition, a FEMA IMAT transitioned into the SEOC to manage federal resources. NDDES is developing two Type III IMATs to assist with, but not take over, certain incident management duties only upon request by local jurisdictions.

On the state level, the spring flood represented the first large-scale test of the Unified Command System (UCS) structure in the SEOC. Although agencies reported the UCS structure worked well, it wasn't always apparent to SEOC staff which portions of the structure had been activated. Some confusion existed about who held which position. UCS charts were not maintained on a regular basis and did not accurately depict the SEOC structure outlining such components as the FEMA IMAT, local liaisons, the Emergency Support Function (ESF) personnel and the Type II IMAT. A daily telephone listing chart added some clarity.

During this disaster the NDSWC, based on their technical expertise, was a member of the Unified Command. However, the Governor and other command officials made decisions without input from the NDSWC. The TAG and NDDES Director included the NDSWC State Engineer on some issues but not all. Although Unified Command officials informally discussed key issues, they did not regularly meet with all Unified Command agencies. General Staff Section Chiefs did not meet on a regular basis.

NDSWC personnel indicated their expertise concerning the hydrology and hydraulics of the Missouri River should have been factored into the decision to use explosives to ensure it would be an effective measure.

Personnel who staffed the SEOC said briefings which included a review of the incident objectives worked well in providing focus to response efforts. The NDDoH Department Operations Center (DOC) based its objectives on those established by the SEOC Unified Command.

There is a need to revise UCS processes and implement training to clarify responsibilities. NDHLS staff members, with input from agencies that staffed the SEOC, are revising checklists to ensure a more seamless operation. Additional training will be pursued through NDDES's training and exercise program.

SEOC Staffing and Operations

The SEOC was inundated with more than 100 personnel from state, voluntary, and federal agencies which created working space issues. The Air Operations branch was moved to another building at Fraine Barracks to accommodate the influx. Additionally,

FEMA operations were housed at a building directly north of the SEOC. The NDNG Joint Operations Center (JOC) was located in another building at the main entrance of Fraine Barracks. The NDDoH and NDDOT activated their Department Operations Centers (DOCs), and the Joint Information Center (JIC) was located in the Media Center at Fraine Barracks before transitioning to a virtual JIC.

On March 6th, the SEOC was at Level III Activation (Monitoring). During the March 20th weekend SEOC activation was elevated to Level II (Partial) when NDHLS staff reported to the SEOC began coordination with the SWC and other agencies. On March 23rd the SEOC was at Level III Activation (Full Scale) and was operational 24/7 for 37 days. SEOC activation was lowered to Level II (Partial) on April 28th and Level III (Monitoring) on May 4th. Although it was discussed, NDHLS and the NDSWC, recommend Level II activation of the SEOC should have taken place prior to the weekend of March 20th.

Because personnel were in one centralized location, inter-agency coordination worked well with those in the SEOC. The National Guard liaisons were able to quickly relay information to the NDNG Joint Operations Center (JOC) to expedite requests for assistance. Difficulties arose when agencies did not consistently staff the SEOC; miscommunications and delays occurred when attempting trying to resolve problems such as clarifying scope of service offered by the shelters to ensure evacuees were directed to the correct shelter. These challenges prompted the recommendation that all agencies involved in advance planning and response be present at the SEOC. Agencies with a limited role were not required to staff the SEOC but were responsible to monitor WebEOC for information and decisions that could impact their areas of responsibility.

Checklists were developed but not used extensively and resulted in a recommendation to review checklists at the beginning of a shift to ensure familiarity with responsibilities. A NDDES liaison was assigned to answer most queries from FEMA and to participate in meetings, which alleviated the workload for the SEOC and FEMA staff.

Other recommendations included controlling SEOC access to include federal Emergency Support Function (ESF) agencies and implementing a sign in/sign out system. The N.D. Board of Animal Health (NDBoAH) questioned why self-deployed non-governmental pet organizations were permitted to staff the SEOC.

On local and state levels, federal assistance was widely praised but the number of personnel dispatched to support local and state operations was called into question. On several occasions responders were forced to brief various federal counterparts on the same issue. At the height of the event, there were 456 FEMA personnel and 395 representatives from 15 federal agencies in North Dakota. The SEOC and local EOCs were not always informed about federal assets brought into the state.

Meals catered into the SEOC received rave reviews. While the hours were long and the pace intense, no agency balked at the tasks and all rose to the challenge of supporting local and tribal governments. For the extended 24/7 staffing requirement, some agencies

struggled to find adequate resources and identified the need to expand emergency operations, ICS and WebEOC training to other personnel.

Common Operating Picture

Multiple events rapidly unfolded, often simultaneously, as flooding occurred in 48 of 53 counties and four tribal reservations. This created a challenge for SEOC staff to accurately capture the common operating picture. Although agencies prepared for record flooding, the magnitude of the event quickly overwhelmed local, tribal and state resources. Rapid deployment of resources to North Dakota and frequent calls requesting assistance added to the difficulty. The NDNG JOC and SEOC suffered situational awareness disconnect when NDNG Task Force East was assigned to work directly with Cass County and Fargo.

The Command and General Staff meetings were combined with the Operations Briefings. The meeting structure worked well with the NWS providing a weather analysis to guide operations, and the State Water Commission and the U.S. Army Corps of Engineers conducting an analysis of issues while other federal and state agencies provided updates and impact analyses. Because of limited space, personnel required to attend sometimes couldn't get in the room and stood in the hallway or room entrance to hear information. Additional accommodations were arranged for other personnel to participate by utilizing speaker phone. Meeting summaries should have been developed and disseminated. Briefing times conflicted with shift changes, causing some personnel to stay well beyond their shift. At the NDDoH DOC, the Bioterrorism Wide Area Network (BTWAN) worked well for intra-agency communication.

Incident summaries were produced twice daily and, given the influx of information, became quite lengthy. The Documentation Unit staff searched ways to balance the amount of information contained in the report and eventually selected only including current information and data from the previous reporting period. The SEOC staff also determined Incident Action Plans (IAPs) should have been developed earlier into the operation. Due to the heavy workload in the SEOC, FEMA took the lead for IAP development. The IAPs did not take into account the entire SEOC structure; state counterparts for various units were not included in the first IAPs because FEMA had not been issued a SEOC organizational chart.

Outgoing Section Chiefs worked well beyond their operational periods to address issues that should be handled by their shift replacements. To overcome this issue, it was suggested training regarding the Emergency Management Assistance Compact (EMAC), EOC operations, ICS (position specific) and the FEMA mission assignment process be obtained for SEOC staff to enhance their capability to address questions and issues raised by the Command Staff during their operational period.

SEOC staff agreed incident summaries should not be posted to the agency home page since content was often for official use only and information was not adequately ground-truthed given the operations tempo. To enhance effectiveness it was suggested the JIC develop talking points and/or fact sheets based on incident summaries and post them to

the website. Staff also recommended developing a standard format for use by emergency managers when reporting information and requesting support.

WebEOC

WebEOC, the SEOC's web-enabled incident management tool, proved invaluable for quickly conveying the common operating picture. Valuable time was saved by directing new staff to Significant Events and Incident Summary boards alleviating the need to provide individual briefings. The developer of WebEOC provided onsite technical assistance for the first two weeks which provided key critical support.

Many emergency managers found the demands of the incident precluded them from entering data; they acknowledged the need to expand WebEOC training to support staff and to incorporate WebEOC into local EOCs. State agency personnel identified the need to pursue WebEOC training for a larger cross section of staff.

Prior to the flood, WebEOC training was offered and conducted during multiple sessions and one-on-one with voluntary, local, tribal, state and federal agency personnel. However, many people from all levels of government acknowledged they did not take advantage of training.

Original plans called for NDHLS staff to update all WebEOC boards, but in application, it became readily apparent individual agencies needed to update boards applicable to their specific area(s) of responsibility.

Agencies suggested an acronym list be added to WebEOC. Another recommendation called for an expansion of individual boards to include specific data elements necessary to capture detailed and historical information, such as adding a field to the pet shelter board that includes daily census reports.

Overall, agencies described WebEOC as a useful tool for monitoring the incident. Feedback indicated an extensive review of WebEOC boards be conducted and appropriate modifications completed.

Mapping

Maps developed for the SEOC helped state agencies identify potential problem areas and pre-position resources. Staff initially used EmerGeo GIS software; its cumbersome nature and unfamiliarity led to reliance on GIS mapping developed by the National Guard and FEMA. The FEMA GIS staff was incorporated into the SEOC Planning Section's Situation Unit and developed maps showing potential areas of inundation. The SWC found the quad maps developed by the USGS adequate for finding elevations.

In after action meetings, other resources were identified such as locally-developed maps, utility company maps, Dickinson State University, Stark County Emergency Management and the N.D. Department of Agriculture. The Information Technology Department recommended greater utilization of the GIS Technical Committee (GISTC), composed of 10 state agencies, to provide multiple benefits to the SEOC. Within the

GISTC, there is detailed knowledge regarding the location/steward of datasets not located on the GIS Hub and the use of GIS software, mapping technologies, and interpretation/proper usage and data application. There was consensus that more LiDAR data is needed for more accurate mapping.

The lack of GIS and mapping expertise within NDDES was evident. There is a need to identify GIS expertise and resources existing within other agencies. It was unclear exactly the specific mapping information required to provide the common operating picture. Several agencies developed maps in isolation without coordinating with other agencies which led to duplication of effort. A central repository for all mapping products is needed along with a coordinator to direct the effort.

Air Operations Branch

Protocols and procedures for the Air Operations Branch (AOB) were not fully developed within the SEOP. Based on expertise, the ND Civil Air Patrol agreed to lead the branch. Initially the AOB was located within the SEOC but as numbers of staff increased, a separate location was required.

The ND Aeronautics Commission (NDAC) linked participating agencies and airport managers.

The AOB Director said combining the Air and Marine Branches was effective since both worked in concert to perform rescue missions. The NDNG and others thought it best to separate the focus of the two branches.

The branch directed flights for aerial reconnaissance, rescue missions and transporting responders and officials. As an example, NDCAP flew photographic missions along the Missouri River to monitor river ice jams in Bismarck and power lines along the Red River Valley. ND Department of Transportation (NDDOT) and NDAC aircraft flew surveillance missions to monitor ice jams statewide for the NDSWC. US Customs and Border Patrol (USCBP) flew UAS Predator B over the Red River Valley and Missouri River to monitor water levels and ice jam conditions. Flight crews from the NDNG and USCBP rescued stranded individuals. NDNG helicopters were used to access ice jams to drill C-4 explosive holes on Missouri River.

Congestion limited access to the state's eight largest airports; flights and resources were redirected to smaller general aviation airports. NDAC staff reported flood support included 58 aircraft and helicopters from North Dakota, Iowa, Wisconsin, Montana, Minnesota and South Dakota National Guards, U.S. Coast Guard (USCG), U.S. Army, USCBP, NDDOT, NDAC, N.D. Game and Fish Department (NDG&F), N.D. Bureau of Criminal Investigation (NDBCI) and NDHP. Jet fuel suppliers were directed to smaller airports because of fuel requirements and limitations. Airport managers cleared snow to make way for the additional aircraft and coordinated with fixed based operators to clear hangar space.

Initially, the capability of NDDOT Flight Operations to provide air transportation and three dimensional (3D) and infrared aerial photos for flood fight efforts were overlooked. Agencies with aviation assets were not always included when planning flights to ensure the right aircraft and crew were assigned to a mission. As an example, NDCAP had been requested to help locate animal carcasses; however, the NDG&F plane turned was used because its aircraft could fly at a lower altitude to obtain more accurate data.

State-federal coordination occasionally failed when ordering assets. N.D. National Guard personnel were not consulted when FEMA requested Department of Defense (DOD) to deploy air assets. At one point, the state had 39 aircraft. NDNG officials described deployment of resources on such a wide scale as unwarranted. However, federal and state agencies staffing the AOB coordinated well. The AOB Director said each cooperated jointly to make unified decisions on the best use of aviation resources

Pilots faced challenges obtaining clearance for air space, which impeded critical flight missions. No prioritization of flights through restricted air space took place at the Fargo Federal Aviation Administration (FAA) tower. Access was granted on a “first-come, first-serve” basis instead of giving priority to critical flight missions. In Bismarck, the FAA prevented planes from entering the air space along the Missouri River after the explosion of ice jams took place, preventing aerial photography of the outcome. Airspace Temporary Flight Restrictions (TFRs) need to be planned at the AOB level with all potential airspace users and FAA representatives participating in the effort to enhance efficiency and safety.

Pilots recommended developing an aviation resource and capabilities list as well as protocols that outline processes such as requests for temporary flight restrictions. They also recommended broader participation by agencies with aviation resources in the AOB.

A daily pilots’ briefing and a centralized website for flight schedules is needed to avoid duplication and streamline efforts to determine which air assets best meet mission requirements. Developing a scalable AOB that aligns with activation levels of the SEOC was suggested. It was viewed as essential to plan for and procure communications equipment that will provide capability for aircraft to aircraft communications as well as to ground based command and control center(s).

Due to the lack of AOB protocols and procedures, the AOB used the State Search and Rescue (SAR) Plan as a guide. An AOB standard operating procedure (SOP) needs to be developed in coordination with state and federal agencies and exercised to identify shortfalls.

Agency Staffing Impacts

The spring flood demanded a lot of time, energy and commitment of state agency staff who worked long hours. Some worked in the SEOC, agency DOCs or served their communities as volunteers. The NDNG mobilized some staff into service. The NDHP reported troopers worked numerous overtime hours. State agencies accommodated employees’ needs. As an example, Workforce Safety and Insurance (WSI) offered

flexible schedules to employees. HRMS worked with the Governor's office to develop office closure policy and announcements. HRMS staff volunteered to sandbag at the Bismarck Civic Center.

Target Capability: Responder Safety

Responder Safety

Agencies reported few injuries among workers. The ND State Electrical Board (NDSEB) indicated guidelines were not always followed for safe restoration of power to buildings. During the disaster, the U.S. Army Corps of Engineers (USACE) was tasked to provide generators. The NDSEB requires North Dakota licensed contractors to wire the generators to the buildings.

Prior to the flood, WSI coordinated with NDDES to address scope of coverage as it relates to volunteers. Flood activity precluded continued discussions. WSI believes Century Code recognizes four classes of emergency responders: firefighters; CERT members; volunteer health care providers; emergency disaster volunteers. The last category is not clearly defined, and raises questions concerning volunteer registration, premium calculation and premium payment responsibility. Legislation should take place to clarify these issues during the next biennium.

Target Capability: Citizen Evacuation and Shelter-in-Place

Coordination

A decision for contra-flow measures for a potential Fargo evacuation points to strong need for improved communications on both the state and local levels. As floodwaters threatened Fargo, planners developed contingency plans for wide scale evacuation of the city. City officials decided not to evacuate but the decision was not communicated quickly enough to the SEOC staff. Officials in the SEOC issued a call to close THE interstate which was executed by the NDHP on the assumption clear communications had been established among SEOC officials, the Cass County Sheriff and the Fargo Police Chief. Upon notification by local authorities, the NDHP Southeast Region Commander had the roadblocks quickly removed. The incident demonstrates the need for local confirmation before closing the major roads.

Evacuation Routes

The Highway Patrol recommends standardized procedures for road closures and travel on flooded roads.

Troopers recommended local and state law enforcement and highway officials work more closely to determine how local evacuation routes tie into the interstate system. NDDOT and local highway officials should discuss which Fargo streets could be changed to one-way avenues and how each connects to the interstate. Keeping the North Dakota-Minnesota bridges open was critical. Fargo officials also had a zoned system for evacuation that was not relayed in detail to the SEOC. Valley City and Jamestown also

have phased evacuation zone plans. The NDHP applied lessons learned in Fargo to Valley City and Jamestown evacuation strategies.

Evacuation of Correctional Facilities

Based on data from Burleigh County Emergency Management, ND Department of Corrections and Rehabilitation (NDDoCR) decided to evacuate the 2,203 Missouri River Correctional Center (MRCC) inmates to the State Penitentiary. NDDoCR secured buses from local contractors and the NDHP provided transportation security. Inmates were evacuated within 45 minutes. A Command Center and medical assessment and distribution center was set up in the Recreation Director's Office and other secured areas. Three days later, inmates were returned to the MRCC.

NDDoCR officials identified the need to develop/review resource lists, contact lists, a waterway rescue plan, a checklist to ensure critical medical files/equipment are transported, e-mail listing for staff who need updates, numbering the areas where inmates are transferred to allow for better accountability. A list of inmates requiring constraints needs to be kept current. An Evacuation Procedure Checklist has been developed as a result of this event. These plans and the role of the NDDoCR should be reflected in the Evacuation, Sheltering and Mass Care Annex of the SEOP.

Target Capability: Mass Care (Sheltering, Feeding and Related Services)

Shelter Management

On local and state levels, responders identified the need for stronger coordination when planning for mass evacuation and sheltering. The timely exchange of information did not always occur when identifying and classifying shelters This resulted in same site selection by different agencies for different shelter types and delays identifying medical shelter locations. Coordination with local law enforcement must be improved in establishing state-supported shelter locations that optimize security and traffic control operations. In Bismarck, the local police department was in charge of security but was never consulted about the best shelter locations.

Actions by officials in the city of Jamestown were presented as a model of successful coordination among multiple agencies working toward shelter management for vulnerable groups. Officials who set up a supportive care shelter at Cheney Middle School in West Fargo successfully folded local care providers that work with special needs populations on a daily basis in with the shelter management team.

Development of a shelter classification process is needed as evidenced in comments provided from the NDDoH and NDDHS, as is the need for common terminology among various agencies when describing shelter capability and capacity. For example, the term "beds" was used by NDDoH for describing medical shelter capacity when in reality evacuees were provided cots. Shelter staffing, available services and classification for clientele type need to be identified in a shelter classification process. Confusion existed

as to the scope of service provided to evacuees at shelters managed by the American Red Cross (ARC). There was a disconnect between the Senior Vice President of Disaster Services who indicated the ARC could care for individuals with special needs and local shelter volunteers and local ARC staff who stated they could not support these individuals. At another shelter, managers turned away some evacuees because the manager did not understand that a medical shelter coexisted in another part of the building. Local officials responsible for establishing a medical shelter must communicate expectations placed upon shelter managers and staff along with a clear explanation of shelter scope of service.

Shelter managers need clear explanation of expectations regarding coordination among different shelter types and tracking evacuees redirected to shelters better capable of providing special needs services. Lack of communication between planners and shelter staff resulted in a disservice to evacuees when some who were directed to a "supportive care" shelter in Casselton by social service personnel were redirected by shelter staff to a local hospital or turned away. Some evacuees simply elected to return home. NDDoH represented shelters as special needs shelters when in reality they were not, as those who showed up at the shelter were triaged by doctors and redirected elsewhere. A lack of documentation created difficulty tracking individuals who were redirected. A system for tracking evacuees needs to be instituted.

The SEOC requested the ND Department of Commerce (NDDoC) to provide a list of available buildings with a minimum of 40,000 square feet and those with at least 10,000 square feet to accommodate sheltering needs. NDDoC would like agencies researching available buildings to provide more clarification regarding potential uses.

Volunteer Coordination

The ND Volunteer Organizations Active in Disasters (NDVOAD) achieved goals of communication, collaboration and coordination among member agencies by holding frequent conference calls and using the list-serve hosted by the ND League of Cities. FEMA provided a conference line for VOAD to schedule and host frequent conference calls, with representatives from NDDHS, FEMA and NDDES. A major challenge for the VOAD was communicating with emergency managers. The VOAD did not have a good mechanism to facilitate information flow during the response phase; however, WebEOC provided overall situational awareness.

NDDES Disaster Recovery staff distributed information to emergency managers regarding VOAD flood recovery services and contact information for volunteer management, donations management, and long term recovery committees.

Donations Management

The NDVOAD identified the National Donations Management Network (NDMN) through AidMatrix was a very useful tool.

Information and Referral Service

As a central source of information for flood response and recovery, 2-1-1 is now recognized by VOAD as a useful resource that allows citizens unprecedented access to services provided by all VOAD agencies. This information and referral service remained in place throughout recovery.

Pet Sheltering

NDBoAH coordinated response activities that included relocation of domestic animals trapped by flood waters, establishing pet shelters in conjunction with state sponsored human shelters, educating state and federal officials how weather, storms, and floods impact agriculture and its cascading effects on the public and removal of carcasses deemed to be public health risks.

To help reduce the problem of abandoned pets, better coordination is needed to ensure pet shelter workers track owner relocation. Census tracking systems used to ensure responders know current and total numbers of pets occupying the shelters also need to be improved.

Local plans lacked adequate detail about pet shelter locations. In one instance a pet shelter was established 10 miles from evacuated owners. Local agencies assigned to support pet sheltering often were unaware they had been tasked. However, the NDBoAH indicated instances in which planning prior to the incident resulted in effective coordination.

Response complications were compounded for NDBoAH by self-dispatched animal welfare groups, who often had a political agenda. One group attempted to divert resources ordered through the SEOC. These organizations attempted to dictate rather than collaborate to resolve issues. Non-governmental animal welfare organizations must be vetted through the State Veterinarian, who needs to be charged with oversight responsibility for animal shelters and assistance to local veterinarians. Some veterinarians expressed frustration dealing with the Humane Society of the United States.

Groups such as Noah's Wish, Humane Society and PetSmart Charities, collaborated effectively with the NDBoAH. Before responding, those groups first contacted the State Veterinarian or the SEOC and communicated their capabilities which provided great clarity, saved valuable time and allowed resource allocation to proceed quickly.

Target Capability: Animal Disease and Emergency Support

Carcass Disposal

Due to an unusual amount of livestock losses statewide, concern for carcass disposal beyond the capability of local producers was identified as a public health and safety concern.

Initial meetings were held in early April 2009 with state agencies identified in the SEOP (Animal Health Incident Annex). The N.D. Department of Agriculture (NDDA) and

NDBoAH's main concerns were focused on public health and safety, number of losses, size of animals, required manpower and equipment needed for recovery and associated costs.

Subsequent meetings were held with the following key agencies; NDDA, NDBoAH, NDDoH, N.D. Historical Society, US Fish and Wildlife, NDNG FEMA and NDDES to develop the Emergency Disposal of Livestock Carcasses plan. State agencies, including the NDDA, NDBoAH, NDDoH and Historical Society developed protocols for processing and validating requests in conjunction with producers and County Extension Agents.

The NDNG recovered and disposed of approximately 250 cattle. Additionally many cattle losses were handled by producers. In actuality, reported losses of cattle/calves well exceeded the 250 carcasses validated by NDDA/NDBoAH and NDDoH as a threat to public health and safety and beyond the producers' capabilities.

FEMA initially did not want to fiscally support carcass disposal and contended that USDA federal agencies (U.S. Fish and Wildlife, National Resources Conservation Service, Farm Service Agency, Animal Plant Health Inspection Service) should be responsible. After consultation with the USDA, FEMA stated it would pay carcass disposal costs if declared a threat to public health and safety as determined by the NDDoH/NDBoAH. This disagreement delayed finalizing the plan.

Target Capability: Critical Resource Logistics and Distribution

EMAC

The NDDoH found the system too cumbersome; it caused several delays in acquiring ambulances from Minnesota. The NDBoAH had requested a team from Minnesota for sheltering; however, the team's scope was limited to animal health care. Therefore, the NDBoAH stressed the importance of specifying the capability needed when requesting resources. The NDNG found the EMAC process worked well and was a success. The paperwork between the state and the NDNG worked well and was timely.

The SEOC requested an EMAC A-Team from Louisiana to process EMAC requests. In retrospect, the request should have been made earlier.

The ND Forest Service (NDFS) recommends state agencies participate in EMAC training with emphasis on the order process and need to provide detailed information about requested resources.

Resource Requests

Agencies reported mixed success requesting assistance through the Request for Assistance Board (RFA). Many agencies stated it was difficult to determine if the missions were completed and noted the lack of detailed information for some missions.

Agencies stated local officials sometimes appeared unfamiliar with the request process for obtaining state and federal resources, which created confusion and delayed delivery of assets. Local Emergency managers reported delays in requests of important resources. They indicated NDDoH wanted to send more resources than what was needed. Some said there was a break in the chain of command on the state side because some promised resources promised during site visits were not delivered since the SEOC was unaware of the commitments.

Many believed permission should have been granted to change the status of a request on the RFA. The NDNG had difficulty tracking resources when missions were expanded to include additional soldiers and equipment. A decision made early by the SEOC and the NDNG JOC to utilize the SEOC's mission numbers was not communicated internally to everyone within the NDNG JOC which created confusion.

The lack of detailed information when requesting resources as well as poor local decision making and coordination delayed state response. Local responders did not always follow protocol and failed to work through the emergency manager when requesting resources. Communication breakdowns sometimes occurred. In one case, NDDOT arrived with its low boy trailers to transport HESCO barriers from one site to another only to find authorities would not release them. It took multiple calls to resolve the situation and created a time delay.

On-site NDNG personnel offered resources without prior approval by the NDNG JOC and coordination through the SEOC. Both the SEOC and the NDNG JOC lost visibility of NDNG resources being deployed to the Fargo-Cass County area when the TAG allowed the city and county to coordinate directly with Task Force East. In addition, situational awareness was lost when several state and federal agencies moved and pre- positioned resources and did not communicate those decisions to the SEOC.

Local officials and emergency managers in some cases were allowed to bypass the SEOC by direct contact with the Governor, TAG or NDHLS Director. In some instances, local jurisdictions were allowed by the Governor, TAG or NDHLS Director to obtain state assets before exhausting private resources.

There is a need to develop guidance outlining the process for requesting and coordinating resources within the SEOC. Some state agencies were not familiar with the process for requesting other state agency resources and associated costs and the Advance Planning Team requested resources without coordinating with the Operations and Logistics Section Chiefs.

Federal Resource Coordination

Overwhelming numbers of federal assets were brought into the state but the amount and types were not always communicated to the SEOC or local EOCs. Local FEMA liaisons did not always stay in their lane and offered resources without proper coordination or a true understanding of the overall common operating picture. For example, a FEMA liaison informed an emergency manager FEMA commodities were staged in Grand

Forks. The liaison urged the emergency manager to request some of the commodities be staged in their area. The liaison did so without taking into account commodities were regionally staged in Grand Forks, Valley City, Jamestown and Bismarck the ingress of a large number of evacuees in the event of mass evacuations.

More training is necessary on the mission assignment process and completion of action request forms.

Use of State Fleet Vehicles

Private car rental companies had no available cars given of the overwhelming influx of federal personnel, making it difficult for federal and local officials to obtain transportation. The shortage prompted NDDOT Fleet Services Division to develop policy that allowed federal response to use state vehicles. NDDOT staff volunteered to transport vehicles to locations where need existed. Vehicles were not returned according to specified schedules or not at all, which forces NDDOT's limited staff to resolve the problems. The Workforce Coordination Center should be explored as an option to find other state agency personnel to transport vehicles.

Target Capability: Emergency Public Information and Warning

Public Information

Agency public information officers (PIOs) urged continuation of preparedness campaigns. As an example, the NDDES PIO posted preparedness information to the agency website and disseminated news releases to the media. The NDDHS PIO developed templates in advance of the emergency that were quickly modified during response to meet the needs of the incident.

PIOs preferred working through a virtual Joint Information Center (JIC). PIOs worked primarily from their offices, FEMA public affairs staff, worked from a central location within the Joint Field Office (JFO).

The spring flood represented the first true test of the virtual JIC concept, and PIOs resoundingly recommended continued implementation. Agencies and the media recommended the continued disseminating information from one central source, i.e. NDJIC.

Disconnects in relaying information between the JIC and the SEOC periodically developed, and some PIOs felt they did not have the common operating picture. PIOs recommended a daily JIC briefing be held after Operational Briefings to deliver a common operating picture, strategize, form objectives and coordinate messages for the day.

Because conflicting data from multiple sources occurred, agencies strongly recommended an authorization process be followed to ensure accuracy of information released to the

public. The agency PIOs stressed the importance of coordinating with each other when reporting data from other agencies. As an example, NDDES received preparedness information on inspection and replacement of electrical panel from a reliable source. However, the NDSEB disagreed with the guidance. Job Service North Dakota noted incorrect information was released regarding regular unemployment insurance (UI) and the disaster unemployment assistance (DUA) program resulting in public confusion.

Unsubstantiated information was reported to a local official during an operations briefing that the Double Ditch ice jam north of Bismarck had broken, creating unnecessary panic among Bismarck-Mandan residents. The information was not credible and was not verified leading to the unnecessary activation of the Emergency Alert System (EAS) by the Bismarck National Weather Service based on a request from a local official. A SWC official was able to quickly verify the information was incorrect; however, EAS activation had already taken place. The activation pointed to the need to evaluate the threat and verify the information from a reliable source before issuing an EAS message.

The volume of public information demands prompted local PIOs to request assistance, which was coordinated through the state-federal JIC. State and federal PIOs were deployed through the JIC to help local governments. The NDNG ordered PIOs to support its operations in Jamestown.

PIOs met public demand by passing information through media and stakeholder groups. NDDOT communications staff issued an extensive number of messages to the public, as evidenced by the WebEOC news release board. At one point, staff faced the challenge of addressing both blizzard and flood conditions while dealing with legislative and federal stimulus package issues.

Target Capability: Communications

Communications became problematic because a frequency plan had not been adopted at the local level resulting in the inability to provide a communications interface with the US Coast Guard and other state/federal assets.

A pre-established standard for GIS coordination, such as North American Datum (NAD) 83, a horizontal coordinate system for U.S., Canada and Mexico, needs to be established to assist assets coming into the state more readily identify locations.

For the Highway Patrol, new laptops with air card capabilities proved to be a timely and valuable tool. The numerous channel capacities allowed troopers to communicate with sheriff's offices and local dispatch centers. A "chat" channel on the Mobile Data Terminals enhanced dissemination of information to the field.

The breakdown in communications regarding the closure and reopening of I-94 points to the need to review protocols to ensure better coordination among local and state agencies.

Target Capability: Structural Damage Assessment

The ND State Electrical Board (NDSEB) encountered federal agencies advising home owners to just clear submerged electrical boards instead of complete replacement. Since the 1997 disaster, NDSEB officials have unsuccessfully tried to change FEMA‘s policy on household inspection and advice to reflect the National Electrical Guidelines for flooding.

The ND Insurance Department (NDID) prepared Flood and Insurance questions and answers for NDDES to use in Disaster Recovery Centers (DRCs) when it was determined there were too few Insurance Department personnel to staff the centers. The department did respond to consumer inquiries and some complaints during and after the flood; but overall there were relatively few complaints. The department monitored the volume of insurance claims made against home, auto, commercial and farm policies which totaled approximately 1,000 with approximately $3,000,000 paid.

The ND Historical Society reviewed and provided comments that have the potential to impact cultural resources (Section 106 of the National Historic Preservation Act). By July 17, 2009, 1,219 projects had been reviewed since April 21, 2009.

E.1.12 Hazard Ranking by County

Plan	Ranking
Adams County	Moderate
Barnes County	Very High
Benson County	High
Billings County[1]	Moderate
Bottineau County	Very High
Bowman County[3]	Moderate
Burke County[4]	Very High
Burleigh County	Moderate
Cass County	Very High
Cavalier County	High
Dickey County	High
Divide County[4]	Very High
Dunn County[1]	Moderate
Eddy County[2]	High
Emmons County	Moderate
Foster County	Moderate
Golden Valley County[1]	Moderate
Grand Forks County	Very High
Grant County	High
Griggs County	Very High
Hettinger County	High
Kidder County	High
LaMoure County	High
Logan County	High
McHenry County	Moderate
McIntosh County	Low
McKenzie County	Low
McLean County	Low
Mercer County	High
Morton County	Moderate
Mountrail County	Moderate
Nelson County	Very High
Oliver County	Moderate
Pembina County	Moderate
Pierce County	Moderate
Ramsey County	Moderate
Ransom County	Moderate
Renville County	Very High
Richland County	High
Rolette County	Very High
Sargent County	High

Plan	Ranking
Sheridan County	High
Sioux County[5]	High
Slope County[3]	Moderate
Spirit Lake Nation	High
Stark County[1]	Moderate
Standing Rock Sioux Tribe[5]	High
Steele County	High
Stutsman County	High
Three Affiliated Tribes	Low
Towner County	High
Traill County	Moderate
Turtle Mountain	Moderate
Walsh County	High
Ward County	Low
Wells County[2]	High
Williams County	Moderate
City of Bismarck	Moderate

Source: Cumulation of data extracted from local and tribal plans

E.2 Fire

E.2.1 Wildfire History

Some of the more significant wildland fire events that have occurred in North Dakota from 1988 to 2013 are described below. These events and descriptions were obtained from the NDDES, NDFS, Federal Wildland Fire Occurrence website, NCEI Storm Events Database, and National Interagency Coordination Center.

• 1988 Fire Season – The 1988 season represented an extreme fire season across the region. North Dakota had at least nine separate fires that were larger than 2,000 acres, including a 10,000-acre fire in Mountrail County.

• October 1999 McKenzie County Wildfire – Strong winds pushed two wildfires in McKenzie and Divide Counties, burning about 70,000 acres in a matter of hours. Twelve farms were evacuated, and one abandoned farm was destroyed. This fire was called the Gap/Rough Creek fire according to the Federal Wildland Fire Occurrence Website.

• August 2000 Blacktail Wildfire – The Blacktail Fire burned nearly 6,000 acres in Billings County in a deep pocket of cedar. No structures were threatened. Earlier in the season, a large fire burned in McKenzie County. Later in the season, another large fire burned in Golden Valley County.

• June-July 2002 Kraft Complex – The Kraft Complex burned approximately 48,000 acres in Sioux and Grant Counties, destroyed 17 residences and 21 outbuildings, burned most of the Town of Shields, and threatened the community of Porcupine. In smaller unrelated fires, two people were killed while fighting fires in Burleigh and Kidder Counties in May 2002. A large fire also burned in Bowman County.

• April 2003 McLean Bottoms Wildfire – The 5,000-acre wildfire along the Missouri River in Emmons County injured one firefighter and forced evacuations of some areas.

• September 2004 Deep Creek Wildfire – 3,820 acres burned on federal, state, and private lands in Slope County through part of a ponderosa pine forest. Two ranches were evacuated.

• April 2005 Wilton Wildfire – Three firefighters suffered burn injuries fighting the 1,200-acre fire southwest of Wilton in Burleigh and McLean Counties. One structure was lost.

• September 2005 Clearwater Lake Wildfire – 7,000 acres burned on federal, state, and private lands in Mountrail County east of Stanley destroying four abandoned farmstead structures.

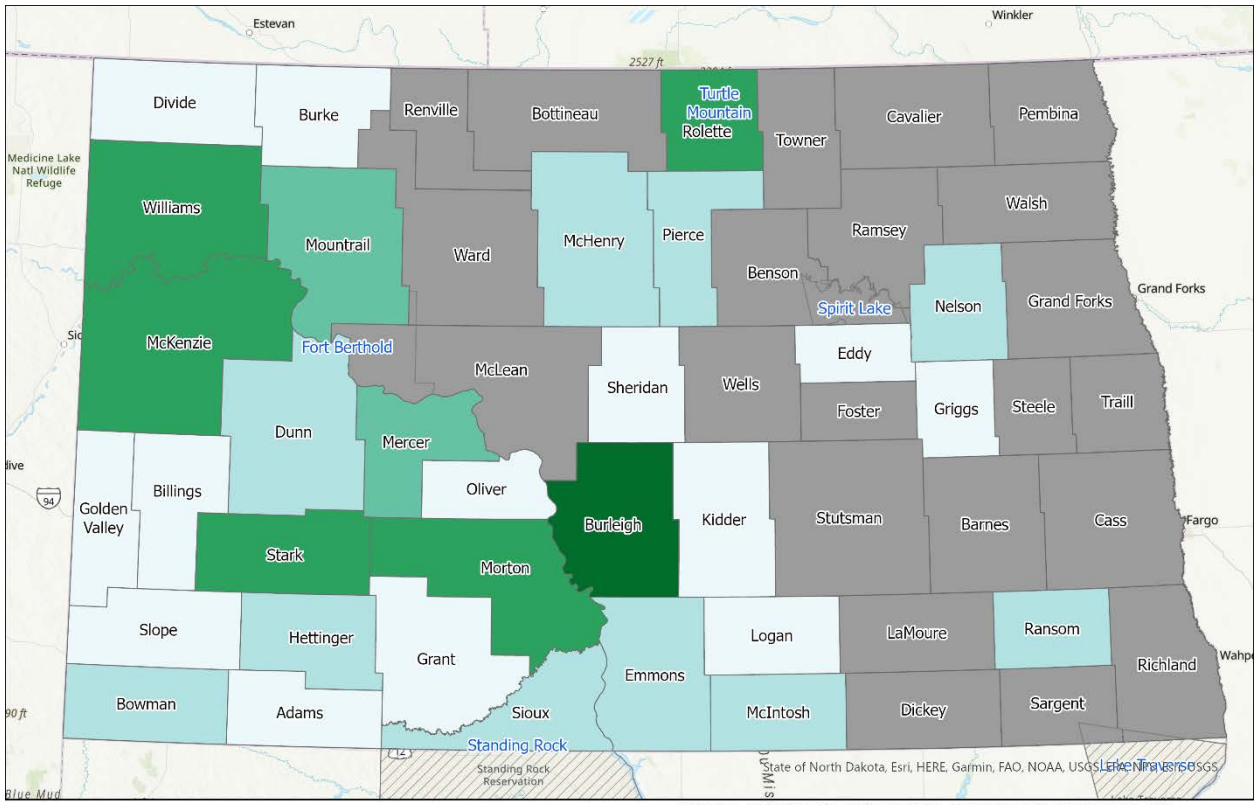
• July 2006 Standing Rock Complex – This complex burned nearly 9,500 acres on the Standing Rock Reservation. Two firefighters were injured. At least ten homes and 400 head of livestock were evacuated. Suppression costs were estimated at $430,000.

• August 2007 Muskrat Lake Wildfire – 2,800 acres burned on the Fort Berthold Reservation south of New Town. Eight structures were lost with suppression costs estimated at $150,000.

• July 2008 – The Brown Wildfire burned 2,405 acres. This fire started from natural causes.

• November 2009 – This late-season fire, known as the Squaw Creek Fire burned 1,580 acres and resulted from human causes

E.2.2 Population in Counties Exposed to Wildfire



POPULATION IN COUNTIES DIRECTLY EXPOSED TO WILDFIRE RISK

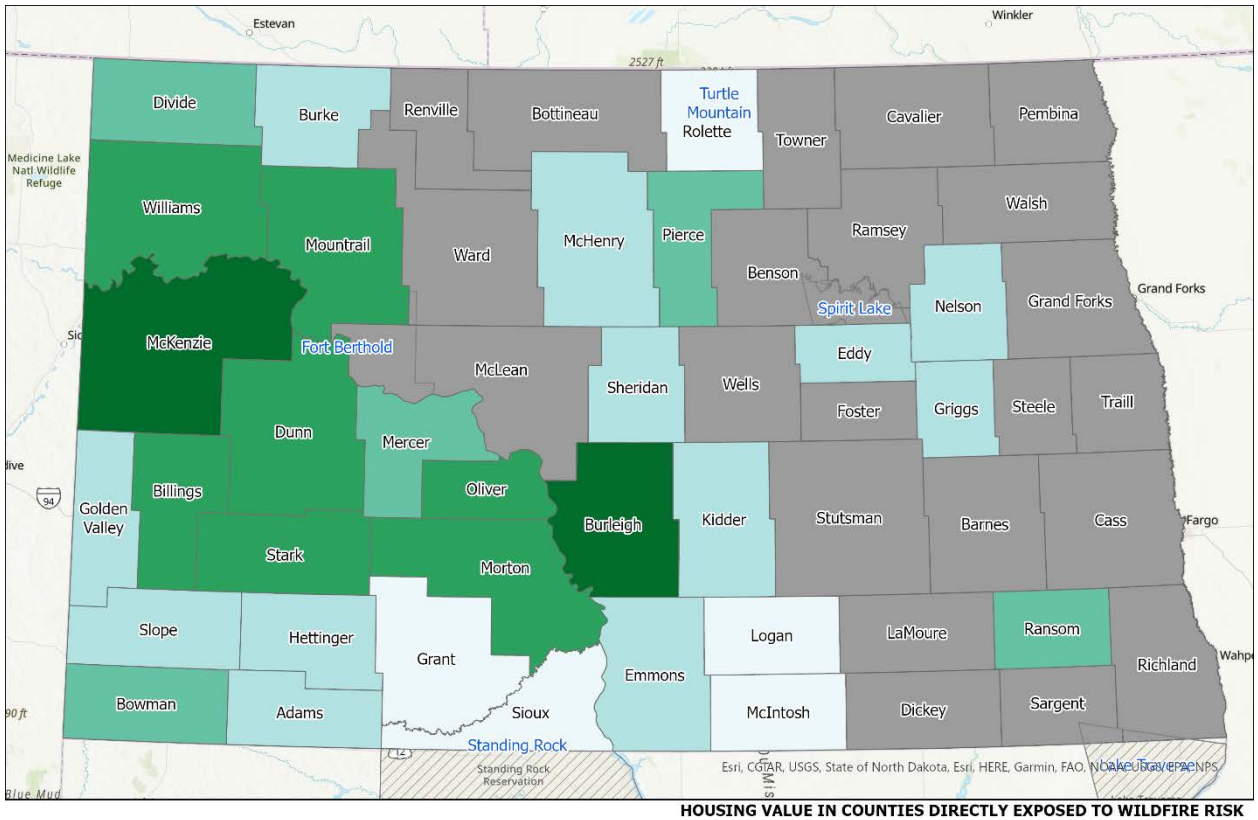
Map Date: 11/12/2023
Data Source: US Census Bureau, US Forest Service
Data date: 2021
Intended for Planning Purposes Only

N

0 25 50 100
Miles

Total Population
- 775 - 2,500
- 2,501 - 6,000
- 6,001 - 12,000
- 12,001 - 40,000
- 40,001 - 97,895

E.2.3 Housing Values in Counties Exposed to Wildfire



HOUSING VALUE IN COUNTIES DIRECTLY EXPOSED TO WILDFIRE RISK

Median House Value

- $77,300.00 - $90,000.00
- $90,000.01 - $120,000.00
- $120,000.01 - $175,000.00
- $175,000.01 - $250,000.00
- $250,000.01 - $309,400.00

Map Date: 11/12/2023
Data Source: US Census Bureau, US Forest Service
Data date: 2021
Intended for Planning Purposes Only

N

0 25 50 100
Miles

E.2.4 Population and Housing in Counties Exposed to Wildfire

County	Past Wildfires (NCEI)	Population	Housing Units	Est. Property Value Exposed
Adams	3	2,237	1,359	$ 138,889,800
Billings	1	839	488	$ 101,796,800
Bowman	1	3,024	1,654	$ 256,370,000
Burke	0	2,177	1,382	$ 162,661,400
Burleigh	5	97,895	42,572	$ 11,673,242,400
Divide	0	2,196	1,417	$ 225,586,400
Dunn	1	4,054	2,211	$ 504,771,300
Eddy	0	2,378	1,244	$ 128,256,400
Emmons	1	3,316	2,084	$ 197,354,800
Golden Valley	1	1,812	967	$ 108,884,200
Grant	2	2,351	1,686	$ 130,327,800
Griggs	0	2,242	1,354	$ 141,086,800
Hettinger	2	2,502	1,394	$ 147,764,000
Kidder	0	2,397	1,617	$ 175,606,200
Logan	0	1,814	1,067	$ 95,176,400
McHenry	0	5,420	2,864	$ 342,248,000
McIntosh	0	2,568	1,725	$ 141,450,000
McKenzie	1	13,762	7,545	$ 2,334,423,000
Mercer	0	8,405	4,678	$ 792,453,200
Morton	1	32,916	15,019	$ 3,307,183,800
Mountrail	0	9,717	5,020	$ 879,002,000
Nelson	0	3,035	1,820	$ 180,726,000
Oliver	1	1,850	927	$ 188,737,200
Pierce	0	4,038	2,048	$ 278,118,400
Ransom	0	5,679	2,562	$ 352,018,800
Rolette	0	12,508	4,680	$ 385,164,000
Sheridan	0	1,328	808	$ 85,163,200
Sioux	4	3,993	1,283	$ 107,130,500
Slope	3	775	434	$ 41,967,800
Stark	2	32,710	15,271	$ 3,645,187,700
Williams	1	38,460	20,079	$ 4,833,015,300
Total: 31	30	308,398	149,259	$ 32,081,763,600

Source: NCEI, 2023; ACS, 2021

E.2.5 Game and Fish Wildfire Losses

Date	Acres	Wildlife Management Area	Habitat
7/28/2019	42	Lonetree WMA	Native/Tame
4/28/2021	100	Van Hook WMA	Native Prairie
5/6/2021	249	Wakopa WMA	Native Woodland
7/1/2021	1	Kimball Bottoms WMA	Grassland
7/21/2021	2	Apple Creek WMA	Grassland
8/9/2021	5	Lonetree WMA	CSN/WSN Native
3/1/2021	40	Maple River WMA	Planted Native
11/1/2022	50	Hamilton Wills WMA	Planted Native
4/22/2023	160	Riverdale WMA	Wooded/Tame
4/29/2023	750	MaClean Bottoms WMA	Wooded/Tame
7/17/2023	30	Douglas Creek WMA	Tame

Source: North Dakota Game and Fish, 2023

E.2.6 Urban Fire History

Below is a summary of some of the more significant urban / structural fires that have impacted the state.

• 1882 – Fire destroyed a large portion of Grand Forks.

• 1884 – Fire destroyed all 65 wood-framed buildings that comprised the commercial district of the City of Devils Lake. City building codes changed after the fire to require commercial buildings to have brick and stone exteriors.

• 1893 – Great Fargo Fire of 1893. Midafternoon in June of 1893, fire broke out in the 500 block of what is now Main Avenue. The cause of the fire is not clear. The 30 mph winds quickly blew the flames to a neighboring gun store causing a keg of gunpowder to explode. *Thirty-one blocks of businesses were destroyed and over 350 buildings burned to ruin, including City Hall and the homes of most of Fargo's 6,000 residents.* (NDSU Archives)

• 1894 – Fire destroyed four city blocks, including City Hall, in LaMoure.

• 1898 – The Great Bismarck Fire of 1898. Reportedly the fire began in the Agent's office of the Northern Pacific depot in the late evening of August 8th and quickly spread to the freight warehouse where it set off two powder kegs. Efforts to contain the blaze failed and by morning most of the business district was smoldering. (Ghosts of North Dakota, 2014)

• 1930 – The North Dakota Capitol was destroyed by fire on December 28. According to a witness, the fire started in the senate chambers on the fourth floor. The original State constitution was saved but most of the State records were lost. A new Capitol building was constructed by 1934. (ward County Historical Society)

Photo: North Dakota State Library

• 1947 – An explosion and fire killed three people and destroyed four city blocks, including nine businesses in Minot on July 21.

• 1966 – Fire destroyed Fargo Central High School on April 19. Losses were estimated at $1 million.

• 1968 – On March 27, seven Jamestown businesses, including the historic Gladstone Hotel were lost to fire

E.2.7 Hazard Ranking by County

Plan	Ranking
Adams County	High
Barnes County	High
Benson County	Low
Billings County[1]	High
Bottineau County	High
Bowman County[3]	Moderate
Burke County[4]	High
Burleigh County	Moderate
Cass County	Low
Cavalier County	Low
Dickey County	Moderate
Divide County[4]	High
Dunn County[1]	High
Eddy County[2]	Moderate
Emmons County	Low
Foster County	Moderate
Golden Valley County[1]	High
Grand Forks County	Moderate
Grant County	Moderate
Griggs County	High
Hettinger County	High
Kidder County	Moderate
LaMoure County	High
Logan County	High
McHenry County	Moderate
McIntosh County	Moderate
McKenzie County	Moderate
McLean County	Low
Mercer County	Moderate
Morton County	High
Mountrail County	Moderate
Nelson County	High
Oliver County	Moderate
Pembina County	High
Pierce County	Moderate
Ramsey County	Low
Ransom County	High
Renville County	Moderate
Richland County	High
Rolette County	Very High
Sargent County	High

Plan	Ranking
Sheridan County	Moderate
Sioux County[5]	Moderate
Slope County[3]	Moderate
Spirit Lake Nation	High
Stark County[1]	High
Standing Rock Sioux Tribe[5]	Moderate
Steele County	Moderate
Stutsman County	Moderate
Three Affiliated Tribes	Moderate
Towner County	Moderate
Traill County	Moderate
Turtle Mountain	High
Walsh County	High
Ward County	Low
Wells County[2]	Moderate
Williams County	Moderate
City of Bismarck	Low

Source: Cumulation of data extracted from local and tribal plans

E.3 Drought

E.3.1 Disaster Declarations

Year	Designation	Title	Counties
1976	Presidential Emergency Declaration	DR 3016	Statewide
1980	Governor Disaster Declaration	State EO	Statewide
1981	Governor Disaster Declaration	State EO	Statewide
1993	Governor Agricultural Disaster Declaration	State EO	Statewide
2002	State Declared Drought Disaster	State EO	Statewide
2003	State Declared Drought Disaster	State EO	Statewide
2004	State Declared Drought Disaster	State EO	Statewide
2005	State Declared Drought Disaster	State EO 2005-01	Statewide
2005	USDA Secretarial Disaster Declaration	S2198	Adams
			Bowman
			Sioux
2006	USDA Secretarial Disaster Declaration	S2344	Adams
			Emmons
			McIntosh
			Sioux
2006	USDA Secretarial Disaster Declaration	S3457	Adams
			Bowman
			Dickey
			McIntosh
2006	USDA Secretarial Disaster Declaration	S2388	Statewide
2006	USDA Secretarial Disaster Declaration	S2392	Dickey
			Sargent
2006	USDA Secretarial Disaster Declaration	S2454	Divide
			Williams
2006	State Declared Drought Disaster	State EO 2006-05.1	Statewide
2008	USDA Secretarial Disaster Declaration		Bowman
			Divide
			Golden Valley
			McKenzie
			Slope

Year	Designation	Title	Counties
			Williams
2008	USDA Secretarial Disaster Declaration		Statewide
2008	State Declared Drought Disaster	State EO 2008-02	McKenzie
			Williams
2012	USDA Secretarial Disaster Declaration	State EO 2012-08	Statewide
2012	USDA Secretarial Disaster Declaration	S3374	Adams
			Bowman
			Dickey
			Emmons
			Sargent
			Sioux
2012	USDA Secretarial Disaster Declaration	S3377	Barnes
			Benson
			Cass
			Eddy
			Foster
			Grand Forks
			Griggs
			La Moure
			Nelson
			Ramsey
			Ransom
			Richland
			Steele
			Stutsman
			Traill
			Walsh
2012	USDA Secretarial Disaster Declaration	S3390	Cass
			Grand Forks
			Richland
			Traill
			Walsh
2012	USDA Secretarial Disaster Declaration	S3393	Emmons
			McIntosh
2012	USDA Secretarial Disaster Declaration	S3400	Dickey
			Eddy
			Emmons
			Foster
			Griggs
			Kidder
			La Moure

Year	Designation	Title	Counties
			Logan
			McIntosh
			Stutsman
			Wells
2012	USDA Secretarial Disaster Declaration	S3405	Benson
			Billings
			Cavalier
			Dunn
			Eddy
			Foster
			Golden Valley
			Griggs
			McKenzie
			Nelson
			Pierce
			Ramsey
			Slope
			Stark
			Towner
			Walsh
			Wells
2012	USDA Secretarial Disaster Declaration	S3408	Pembina
			Walsh
2012	USDA Secretarial Disaster Declaration	S3416	Bowman
			Golden Valley
			Slope
2012	USDA Secretarial Disaster Declaration	S3424	Billings
			Dunn
			Grant
			Hettinger
			Mercer
			Morton
			Slope
			Stark
2012	USDA Secretarial Disaster Declaration	S3433	Dickey
			Ransom
			Richland
			Sargent
2012	USDA Secretarial Disaster Declaration	S3436	Burke
			Divide
			Mountrail
			Renville

Year	Designation	Title	Counties
			Ward
			Williams
2012	USDA Secretarial Disaster Declaration	S3437	Golden Valley
			McKenzie
			Williams
2012	USDA Secretarial Disaster Declaration	S3467	Benson
			Billings
			Bowman
			Burleigh
			Cavalier
			Dunn
			Emmons
			Golden Valley
			Grand Forks
			Grant
			Hettinger
			Kidder
			Logan
			McHenry
			McIntosh
			McKenzie
			McLean
			Mercer
			Morton
			Mountrail
			Nelson
			Oliver
			Pembina
			Pierce
			Ramsey
			Rolette
			Sheridan
			Sioux
			Slope
			Stark
			Stutsman
			Towner
			Walsh
			Ward
			Wells
			Williams
2012	USDA Secretarial Disaster Declaration	S3468	Richland
			Sargent

Year	Designation	Title	Counties
2013	USDA Secretarial Disaster Declaration	S3522	Adams
			Bowman
			Emmons
			Sioux
2013	USDA Secretarial Disaster Declaration	S3620	Adams
			Barnes
			Benson
			Bottineau
			Burke
			Burleigh
			Cass
			Cavalier
			Dickey
			Divide
			Dunn
			Eddy
			Emmons
			Foster
			Grand Forks
			Grant
			Griggs
			Hettinger
			Kidder
			LaMoure
			Logan
			McHenry
			McIntosh
			McKenzie
			McLean
			Mercer
			Morton
			Mountrail
			Nelson
			Oliver
			Pembina
			Pierce
			Ramsey
			Renville
			Rolette
			Sheridan
			Sioux
			Stark
			Steele

Year	Designation	Title	Counties
			Stutsman
			Towner
			Traill
			Walsh
			Ward
			Wells
			Williams
2014	USDA Secretarial Disaster Declaration	S3804	Adams
			Benson
			Billings
			Bottineau
			Bowman
			Burke
			Burleigh
			Cass
			Cavalier
			Divide
			Dunn
			Eddy
			Emmons
			Golden Valley
			Grand Forks
			Grant
			Griggs
			Hettinger
			Kidder
			Logan
			McHenry
			McIntosh
			McKenzie
			McLean
			Mercer
			Morton
			Mountrail
			Nelson
			Oliver
			Pembina
			Pierce
			Ramsey
			Renville
			Rolette
			Sheridan
			Sioux

Year	Designation	Title	Counties
			Slope
			Stark
			Steele
			Towner
			Traill
			Walsh
			Ward
			Williams
2015	USDA Secretarial Disaster Declaration	S3959	Benson
			Burke
			Burleigh
			Cavalier
			Divide
			Eddy
			Grand Forks
			Griggs
			Kidder
			McHenry
			McLean
			Mountrail
			Nelson
			Pembina
			Pierce
			Ramsey
			Renville
			Sheridan
			Steele
			Towner
			Traill
			Walsh
			Ward
			Wells
			Williams
2015	USDA Secretarial Disaster Declaration	S3960	Benson
			Billings
			Burke
			Cavalier
			Divide
			Dunn
			Eddy
			Foster
			Golden Valley
			Grant

Year	Designation	Title	Counties
			Griggs
			Hettinger
			McKenzie
			Mercer
			Morton
			Mountrail
			Nelson
			Ramsey
			Slope
			Stark
			Towner
			Walsh
			Wells
			Williams
2015	USDA Secretarial Disaster Declaration	S3961	Benson
			Billings
			Burleigh
			Dunn
			Eddy
			Emmons
			Foster
			Golden Valley
			Kidder
			LaMoure
			Logan
			McHenry
			McIntosh
			McKenzie
			McLean
			Mercer
			Morton
			Mountrail
			Nelson
			Oliver
			Pierce
			Ramsey
			Sheridan
			Sioux
			Slope
			Stutsman
			Towner
			Ward
			Wells

Year	Designation	Title	Counties
2015	USDA Secretarial Disaster Declaration	S4000	Adams
			Bowman
2016	USDA Secretarial Disaster Declaration	S4035	Bowman
			Golden Valley
			Slope
2016	USDA Secretarial Disaster Declaration	S4036	Adams
			Bowman
			Slope
2016	USDA Secretarial Disaster Declaration	S4039	Adams
2016	USDA Secretarial Disaster Declaration	S4138	Adams
			Billings
			Bowman
			Burleigh
			Dunn
			Emmons
			Golden Valley
			Grant
			Hettinger
			Kidder
			Logan
			McIntosh
			McKenzie
			Mercer
			Morton
			Sioux
			Slope
			Stark
2016	USDA Secretarial Disaster Declaration	S4185	Divide
			McKenzie
			Williams
2017	USDA Secretarial Disaster Declaration	S4186	Adams
			Billings
			Bowman
			Burke
			Burleigh
			Divide
			Dunn
			Emmons
			Golden Valley
			Grant
			Hettinger
			Kidder

Year	Designation	Title	Counties
			McHenry
			McKenzie
			McLean
			Mercer
			Morton
			Mountrail
			Oliver
			Renville
			Sheridan
			Sioux
			Slope
			Stark
			Ward
			Williams
2017	State Declared Drought Disaster	State EO-2017-07	Statewide
2017	State Declared Drought Disaster	State EO 2017-12	Statewide
2017	USDA Secretarial Disaster Declaration	S4187	Dickey
			Emmons
			McIntosh
2017	USDA Secretarial Disaster Declaration	S4190	Bowman
			Golden Valley
			McKenzie
			Slope
2017	USDA Secretarial Disaster Declaration	S4191	Adams
			Billings
			Burke
			Burleigh
			Dickey
			Dunn
			Emmons
			Golden Valley
			Grant
			Hettinger
			Kidder
			LaMoure
			Logan
			McIntosh
			McKenzie
			McLean
			Mercer
			Morton

Year	Designation	Title	Counties
			Mountrail
			Sioux
			Stark
			Stutsman
			Ward
			Williams
2017	USDA Secretarial Disaster Declaration	S4193	McKenzie
			Williams
2017	USDA Secretarial Disaster Declaration	S4194	Adams
			Emmons
			Sioux
2017	USDA Secretarial Disaster Declaration	S4196	Bottineau
			Burleigh
			Dickey
			Emmons
			Kidder
			LaMoure
			Logan
			McHenry
			McIntosh
			McLean
			Pierce
			Ransom
			Renville
			Sargent
			Sheridan
			Stutsman
			Ward
			Wells
2017	USDA Secretarial Disaster Declaration	S4198	Adams
			Bowman
2017	USDA Secretarial Disaster Declaration	S4200	Barnes
			Bottineau
			Burke
			Dickey
			Divide
			LaMoure
			Logan
			McHenry
			McIntosh
			Mountrail
			Ransom
			Renville

Year	Designation	Title	Counties
			Stutsman
			Ward
			Williams
2017	USDA Secretarial Disaster Declaration	S4201	Dickey
			Sargent
2017	USDA Secretarial Disaster Declaration	S4204	Benson
			Bottineau
			McHenry
			Pierce
			Rolette
			Sheridan
			Towner
			Wells
2017	USDA Secretarial Disaster Declaration	S4227	Bottineau
			McHenry
			Pierce
			Renville
			Rolette
2017	USDA Secretarial Disaster Declaration	S4263	Barnes
			Benson
			Bottineau
			Cass
			Dickey
			Eddy
			Foster
			Griggs
			Kidder
			LaMoure
			Logan
			Nelson
			Pierce
			Ramsey
			Ransom
			Richland
			Rolette
			Sargent
			Steele
			Stutsman
			Towner
			Traill
			Wells
2017	USDA Secretarial Disaster Declaration	S4277	Barnes
			Cass

Year	Designation	Title	Counties
			Cavalier
			Eddy
			Foster
			Grand Forks
			Griggs
			Nelson
			Pembina
			Ramsey
			Steele
			Stutsman
			Towner
			Traill
			Walsh
2017	USDA Secretarial Disaster Declaration	S4330	Adams
			Billings
			Bowman
			Burke
			Burleigh
			Dickey
			Divide
			Dunn
			Emmons
			Golden Valley
			Grant
			Hettinger
			Kidder
			LaMoure
			Logan
			McHenry
			McIntosh
			McKenzie
			McLean
			Mercer
			Morton
			Mountrail
			Oliver
			Pierce
			Renville
			Sheridan
			Sioux
			Slope
			Stark
			Ward

Year	Designation	Title	Counties
			Wells
			Williams
2018	USDA Secretarial Disaster Declaration	S4346	Bottineau
			McHenry
			Pierce
			Renville
			Rolette
2018	USDA Secretarial Disaster Declaration	S4353	Bottineau
			McHenry
			McLean
			Pierce
			Renville
			Sheridan
			Ward
2018	USDA Secretarial Disaster Declaration	S4401	Bottineau
			Burke
			McHenry
			McLean
			Mountrail
			Renville
			Ward
2018	USDA Secretarial Disaster Declaration	S4412	Benson
			Eddy
			Foster
			Grand Forks
			Griggs
			Kidder
			Nelson
			Pierce
			Ramsey
			Sheridan
			Steele
			Stutsman
			Walsh
			Wells
2018	USDA Secretarial Disaster Declaration	S4418	Benson
			Bottineau
			McHenry
			Pierce
			Rolette
			Sheridan
			Towner
			Wells

Year	Designation	Title	Counties
2018	USDA Secretarial Disaster Declaration	S4419	Dickey
			Sargent
2018	USDA Secretarial Disaster Declaration	S4423	Bottineau
			Pierce
			Rolette
			Towner
2018	USDA Secretarial Disaster Declaration	S4432	McKenzie
			Williams
2018	USDA Secretarial Disaster Declaration	S4489	Adams
			Grant
			Hettinger
			Morton
			Sioux
			Stark
2019	USDA Secretarial Disaster Declaration	S4630	Pembina
2019	USDA Secretarial Disaster Declaration	S4640	Benson
			Bottineau
			Burke
			Cavalier
			Divide
			Eddy
			Grand Forks
			McHenry
			McLean
			Mountrail
			Nelson
			Pembina
			Pierce
			Ramsey
			Renville
			Rolette
			Sheridan
			Towner
			Walsh
			Ward
			Wells
			Williams
2020	USDA Secretarial Disaster Declaration	S4840	Burleigh
			Emmons
			Grant
			Kidder
			McLean

Year	Designation	Title	Counties
			Mercer
			Morton
			Oliver
			Sheridan
			Sioux
			Stark
2020	USDA Secretarial Disaster Declaration	S4864	Divide
			McKenzie
			Williams
2021	USDA Secretarial Disaster Declaration	S4939	Adams
			Barnes
			Benson
			Billings
			Bottineau
			Bowman
			Burke
			Burleigh
			Cavalier
			Dickey
			Divide
			Dunn
			Eddy
			Emmons
			Foster
			Golden Valley
			Grand Forks
			Grant
			Griggs
			Hettinger
			Kidder
			LaMoure
			Logan
			McHenry
			McIntosh
			McKenzie
			McLean
			Mercer
			Morton
			Mountrail
			Nelson
			Oliver
			Pembina
			Pierce

Year	Designation	Title	Counties
			Ramsey
			Ransom
			Renville
			Rolette
			Sheridan
			Sioux
			Slope
			Stark
			Steele
			Stutsman
			Towner
			Walsh
			Ward
			Wells
			Williams
2020	USDA Secretarial Disaster Declaration	S4948	Adams
			Billings
			Bowman
			Burke
			Divide
			Dunn
			Golden Valley
			Grant
			Hettinger
			McKenzie
			McLean
			Mercer
			Morton
			Mountrail
			Oliver
			Sioux
			Slope
			Stark
			Williams
2020	USDA Secretarial Disaster Declaration	S4949	Benson
			Bottineau
			Burke
			Burleigh
			Divide
			Eddy
			Emmons
			Foster
			Kidder

Year	Designation	Title	Counties
			Logan
			McHenry
			McLean
			Pierce
			Renville
			Rolette
			Sheridan
			Stutsman
			Towner
			Ward
			Wells
			Williams
2020	USDA Secretarial Disaster Declaration	S4950	Adams
			Billings
			Bowman
			Golden Valley
			Hettinger
			Slope
			Stark
2021	USDA Secretarial Disaster Declaration	S4960	Bowman
			Divide
			Golden Valley
			McKenzie
			Slope
			Williams
2021	USDA Secretarial Disaster Declaration	S4961	Barnes
			Cass
			Eddy
			Foster
			Grand Forks
			Griggs
			LaMoure
			Nelson
			Ransom
			Steele
			Stutsman
			Traill
			Walsh
2021	USDA Secretarial Disaster Declaration	S4964	Adams
			Bowman
			Dickey
			Emmons
			McIntosh

Year	Designation	Title	Counties
			Sioux
2021	USDA Secretarial Disaster Declaration	S4971	Dickey
			LaMoure
			McIntosh
			Ransom
			Sargent
2021	USDA Secretarial Disaster Declaration	S4983	Barnes
			Cass
			Grand Forks
			Ransom
			Richland
			Steele
			Traill
2021	USDA Secretarial Disaster Declaration	S4996	Dickey
			Sargent
2021	USDA Secretarial Disaster Declaration	S5006	Grand Forks
			Pembina
			Traill
			Walsh
2021	USDA Secretarial Disaster Declaration	S5015	Pembina
2021	USDA Secretarial Disaster Declaration	S5021	Cass
			Traill
2021	USDA Secretarial Disaster Declaration	S5030	Barnes
			Cass
			Dickey
			LaMoure
			Ransom
			Richland
			Sargent
2021	USDA Secretarial Disaster Declaration	S5032	Richland
			Sargent
2021	USDA Secretarial Disaster Declaration	S5040	Cass
			Ransom
			Richland
			Sargent
2021	USDA Secretarial Disaster Declaration	S5041	Richland
			Sargent
2021	USDA Secretarial Disaster Declaration	S5046	Cass
			Richland
2021	USDA Secretarial Disaster Declaration	S5070	Richland
2022		S5162	Billings

Year	Designation	Title	Counties
	USDA Secretarial Disaster Declaration		Burke
			Divide
			Dunn
			Golden Valley
			McKenzie
			Mountrail
			Slope
			Stark
			Williams
2022	USDA Secretarial Disaster Declaration	S5181	Divide
			McKenzie
			Williams
2021	USDA Secretarial Disaster Declaration	S5203	Adams
			Barnes
			Benson
			Billings
			Bottineau
			Bowman
			Burke
			Burleigh
			Cass
			Cavalier
			Divide
			Dunn
			Eddy
			Emmons
			Foster
			Golden Valley
			Grand Forks
			Grant
			Griggs
			Hettinger
			Kidder
			LaMoure
			Logan
			McHenry
			McIntosh
			McKenzie
			McLean
			Mercer
			Morton
			Mountrail
			Nelson

Year	Designation	Title	Counties
			Oliver
			Pembina
			Pierce
			Ramsey
			Renville
			Rolette
			Sheridan
			Sioux
			Slope
			Stark
			Steele
			Stutsman
			Towner
			Traill
			Walsh
			Ward
			Wells
			Williams
2022	USDA Secretarial Disaster Declaration	S5333	Golden Valley
			McKenzie
2022	USDA Secretarial Disaster Declaration	S5336	Bowman
			Golden Valley
			Slope
2022	USDA Secretarial Disaster Declaration	S5366	Billings
			Burleigh
			Dunn
			Emmons
			Golden Valley
			Kidder
			Logan
			McIntosh
			McKenzie
			McLean
			Mercer
			Morton
			Mountrail
			Oliver
			Sheridan
			Sioux
			Stark
			Stutsman
			Wells
			Williams

Year	Designation	Title	Counties
2023	USDA Secretarial Disaster Declaration	S5520	Benson
			Bottineau
			Cavalier
			Eddy
			McHenry
			McLean
			Nelson
			Pembina
			Pierce
			Ramsey
			Renville
			Rolette
			Sheridan
			Towner
			Walsh
			Ward
			Wells
2023	USDA Secretarial Disaster Declaration	S5535	Richland
2023	USDA Secretarial Disaster Declaration	S5547	Richland
			Sargent
2023	USDA Secretarial Disaster Declaration	S5556	Bottineau
			Burke
			Divide
			McHenry
			McLean
			Mountrail
			Renville
			Ward
			Williams

Source: USDA, 2023

E.3.2 Drought Vulnerability Analysis

County	Commodity Total Sales (2019)	Annualized Drought Crop Loss 2017-2023	Drought Loss Percent of Total Loss	Drought Loss Percent of Sales	Vulnerability
Adams County	$ 60,396,000.00	$3,042,027.23	50.3%	5.0%	High
Barnes County	$ 278,736,000.00	$2,744,373.47	8.6%	1.0%	Low
Benson County	$ 164,317,000.00	$7,597,705.33	56.8%	4.6%	Moderate
Billings County	$ 28,754,000.00	$1,185,212.45	73.4%	4.1%	Moderate
Bottineau County	$ 215,501,000.00	$5,775,279.61	35.5%	2.7%	Moderate
Bowman County	$ 74,079,000.00	$3,255,839.14	57.1%	4.4%	Moderate
Burke County	$ 71,578,000.00	$1,263,094.69	13.6%	1.8%	Low
Burleigh County	$ 134,131,000.00	$10,556,163.87	81.0%	7.9%	High
Cass County	$ 439,453,000.00	$2,808,135.49	10.7%	0.6%	Low
Cavalier County	$ 280,592,000.00	$6,633,529.30	39.2%	2.4%	Low
Dickey County	$ 225,092,000.00	$2,699,478.06	10.7%	1.2%	Low
Divide County	$ 71,450,000.00	$2,332,975.25	30.1%	3.3%	Moderate
Dunn County	$ 77,605,000.00	$2,754,156.22	61.0%	3.5%	Moderate
Eddy County	$ 82,231,000.00	$3,432,747.30	46.5%	4.2%	Moderate
Emmons County	$ 162,102,000.00	$13,895,241.48	72.1%	8.6%	High
Foster County	$ 118,733,000.00	$3,709,175.19	30.2%	3.1%	Moderate
Golden Valley County	$ 45,171,000.00	$3,626,402.26	72.4%	8.0%	High
Grand Forks County	$ 318,362,000.00	$4,682,412.66	20.8%	1.5%	Low
Grant County	$ 83,018,000.00	$5,212,871.97	66.7%	6.3%	High
Griggs County	$ 114,622,000.00	$2,514,770.29	26.6%	2.2%	Low
Hettinger County	$ 66,553,000.00	$2,860,186.76	33.1%	4.3%	Moderate
Kidder County	$ 113,586,000.00	$5,129,522.22	58.5%	4.5%	Moderate
LaMoure County	$ 225,991,000.00	$3,529,696.27	12.0%	1.6%	Low
Logan County	$ 155,379,000.00	$4,837,973.41	60.6%	3.1%	Moderate
McHenry County	$ 146,347,000.00	$10,471,135.00	71.6%	7.2%	High
McIntosh County	$ 94,800,000.00	$6,911,100.97	60.0%	7.3%	High
McKenzie County	$ 104,690,000.00	$3,415,221.18	71.1%	3.3%	Moderate
McLean County	$ 176,922,000.00	$21,196,872.51	82.9%	12.0%	High
Mercer County	$ 57,168,000.00	$4,537,149.27	88.7%	7.9%	High
Morton County	$ 145,997,000.00	$8,372,721.77	79.5%	5.7%	High
Mountrail County	$ 135,742,000.00	$6,145,420.42	62.0%	4.5%	Moderate
Nelson County	$ 120,888,000.00	$2,095,834.04	22.8%	1.7%	Low
Oliver County	$ 47,326,000.00	$3,284,030.36	91.2%	6.9%	High
Pembina County	$ 282,661,000.00	$7,077,743.37	55.2%	2.5%	Moderate
Pierce County	$ 98,774,000.00	$8,573,047.63	71.7%	8.7%	High
Ramsey County	$ 190,189,000.00	$4,493,209.91	30.5%	2.4%	Low
Ransom County	$ 173,624,000.00	$1,307,993.03	9.4%	0.8%	Low
Renville County	$ 125,488,000.00	$3,802,152.26	25.8%	3.0%	Moderate

County	Commodity Total Sales (2019)	Annualized Drought Crop Loss 2017-2023	Drought Loss Percent of Total Loss	Drought Loss Percent of Sales	Vulnerability
Richland County	$ 390,797,000.00	$1,420,544.24	12.4%	0.4%	Low
Rolette County	$ 91,542,000.00	$3,179,687.71	44.7%	3.5%	Moderate
Sargent County	$ 214,144,000.00	$2,223,617.72	13.2%	1.0%	Low
Sheridan County	$ 92,044,000.00	$5,784,108.43	67.8%	6.3%	High
Sioux County	$ 61,906,000.00	$1,522,160.22	58.7%	2.5%	Moderate
Slope County	$ 19,787,000.00	$2,490,805.17	51.6%	12.6%	High
Stark County	$ 68,476,000.00	$2,787,261.39	43.4%	4.1%	Moderate
Steele County	$ 149,924,000.00	$2,359,730.69	22.4%	1.6%	Low
Stutsman County	$ 335,625,000.00	$8,930,512.62	24.5%	2.7%	Moderate
Towner County	$ 166,148,000.00	$2,827,168.79	21.5%	1.7%	Low
Traill County	$ 225,930,000.00	$3,123,735.68	17.5%	1.4%	Low
Walsh County	$ 335,598,000.00	$7,635,466.16	52.7%	2.3%	Low
Ward County	$ 205,986,000.00	$13,978,863.54	63.3%	6.8%	High
Wells County	$ 208,249,000.00	$10,868,998.89	51.9%	5.2%	High
Williams County	$ 131,781,000.00	$6,270,785.85	50.2%	4.8%	Moderate

Source: USDA Risk Management Agency, 2023; USDA Agriculture Census, 2019

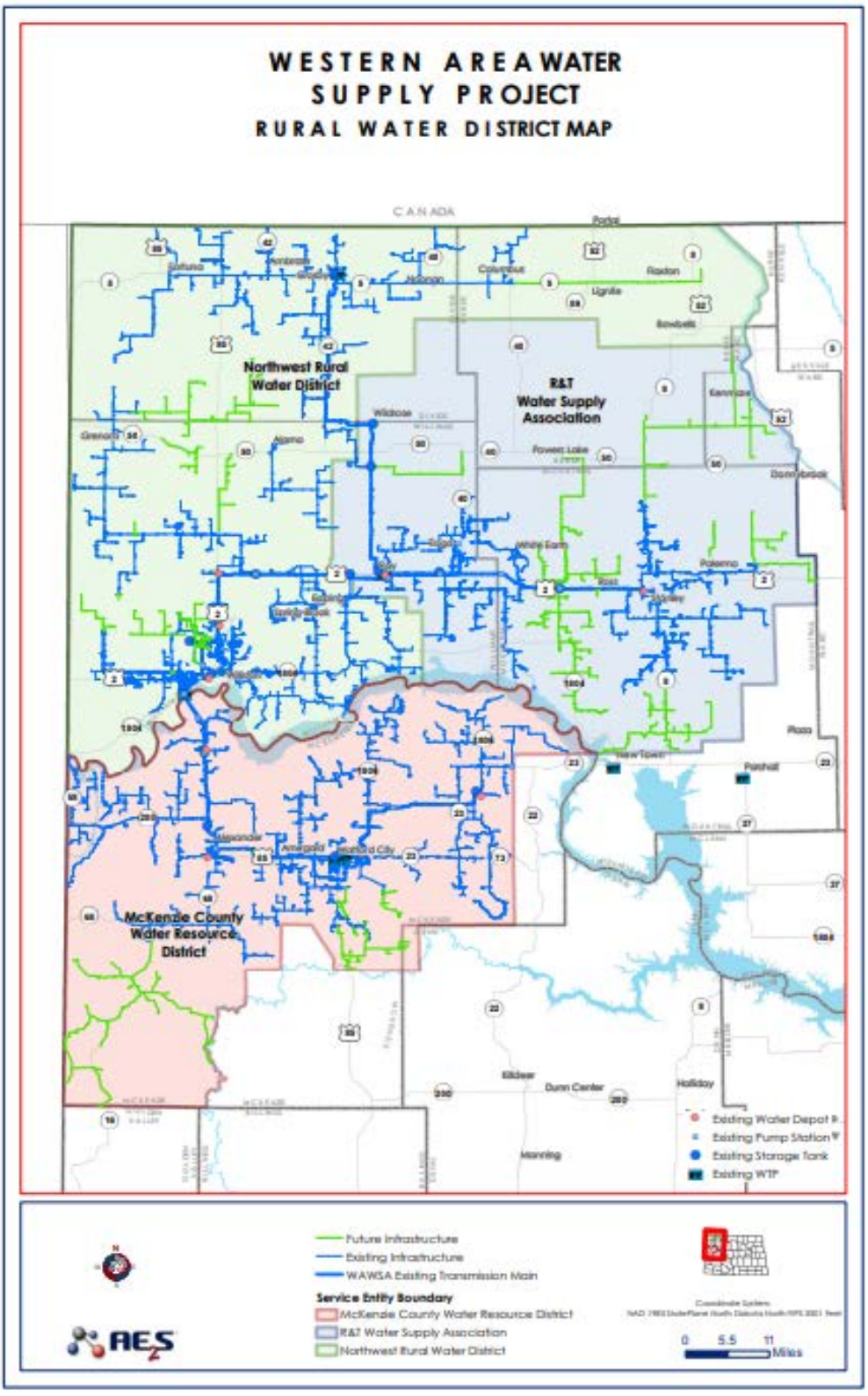
E.3.3 Population Change and Drought Vulnerability

County	Population 2020	Population 2040	Change 2020-2040	Percent Change	Vulnerability
Adams	2,368	2,081	-287	-12.1%	High
Barnes	11,062	10,259	-803	-7.3%	Low
Benson	7,322	9,018	1,696	23.2%	Moderate
Billings	987	1,217	230	23.3%	Moderate
Bottineau	6,768	6,627	-141	-2.1%	Moderate
Bowman	3,367	3,603	236	7.0%	Moderate
Burke	2,481	3,106	625	25.2%	Low
Burleigh	97,770	114,018	16,248	16.6%	High
Cass	182,259	232,293	50,034	27.5%	Low
Cavalier	3,771	3,344	-427	-11.3%	Low
Dickey	5,027	4,542	-485	-9.6%	Low
Divide	2,510	2,954	444	17.7%	Moderate
Dunn	4,882	6,431	1,549	31.7%	Moderate
Eddy	2,299	2,296	-3	-0.1%	Moderate
Emmons	3,324	2,978	-346	-10.4%	High
Foster	3,336	3,291	-45	-1.3%	Moderate
Golden Valley	1,924	2,176	252	13.1%	High
Grand Forks	74,366	89,398	15,032	20.2%	Low
Grant	2,392	2,286	-106	-4.4%	High
Griggs	2,222	1,743	-479	-21.6%	Low
Hettinger	2,713	3,022	309	11.4%	Moderate
Kidder	2,453	2,209	-244	-9.9%	Moderate
LaMoure	4,106	3,872	-234	-5.7%	Low
Logan	1,912	1,935	23	1.2%	Moderate
McHenry	6,125	6,848	723	11.8%	High
McIntosh	2,603	2,101	-502	-19.3%	High
McKenzie	14,586	26,683	12,097	82.9%	Moderate
McLean	9,894	10,570	676	6.8%	High
Mercer	8,930	8,675	-255	-2.9%	High
Morton	31,621	36,254	4,633	14.7%	High
Mountrail	11,210	16,103	4,893	43.6%	Moderate
Nelson	2,861	2,330	-531	-18.6%	Low
Oliver	1,902	1,931	29	1.5%	High
Pembina	6,974	5,829	-1,145	-16.4%	Moderate
Pierce	4,243	4,040	-203	-4.8%	High
Ramsey	11,838	11,695	-143	-1.2%	Low
Ransom	5,438	5,180	-258	-4.7%	Low
Renville	2,595	2,674	79	3.0%	Moderate
Richland	16,540	16,241	-299	-1.8%	Low
Rolette	15,629	18,641	3,012	19.3%	Moderate
Sargent	3,899	3,740	-159	-4.1%	Low

County	Population 2020	Population 2040	Change 2020-2040	Percent Change	Vulnerability
Sheridan	1,292	1,114	-178	-13.8%	High
Sioux	4,748	6,231	1,483	31.2%	Moderate
Slope	796	801	5	0.6%	High
Stark	34,170	45,825	11,655	34.1%	Moderate
Steele	1,942	1,843	-99	-5.1%	Low
Stutsman	21,224	20,197	-1,027	-4.8%	Moderate
Towner	2,258	2,236	-22	-1.0%	Low
Traill	8,029	7,714	-315	-3.9%	Low
Walsh	10,975	10,470	-505	-4.6%	Low
Ward	76,184	94,378	18,194	23.9%	High
Wells	4,028	3,641	-387	-9.6%	High
Williams	39,380	63,505	24,125	61.3%	Moderate

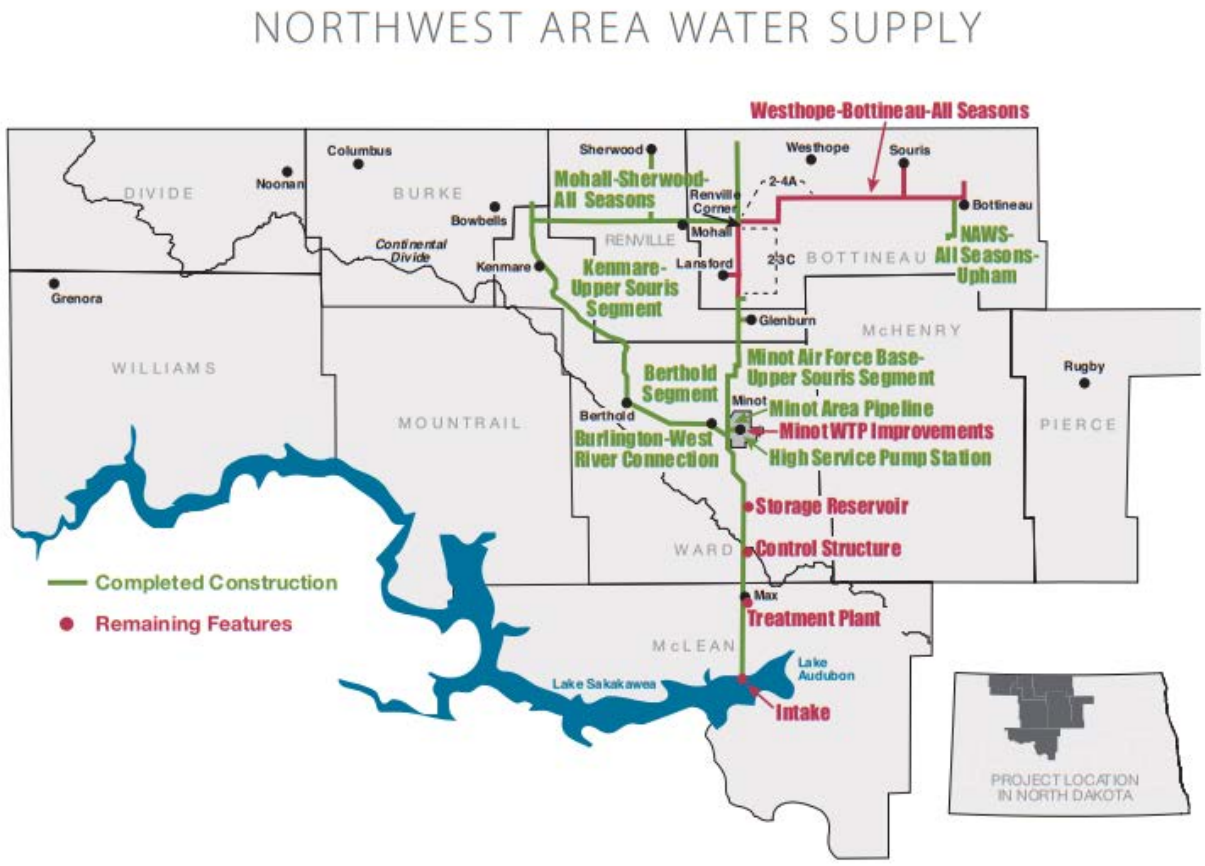
Source: USDA Risk Management Agency, 2023; USDA Agriculture Census, 2019, U.S. Census Bureau, 2020

E.3.4 Northwest Area Water Supply Projects



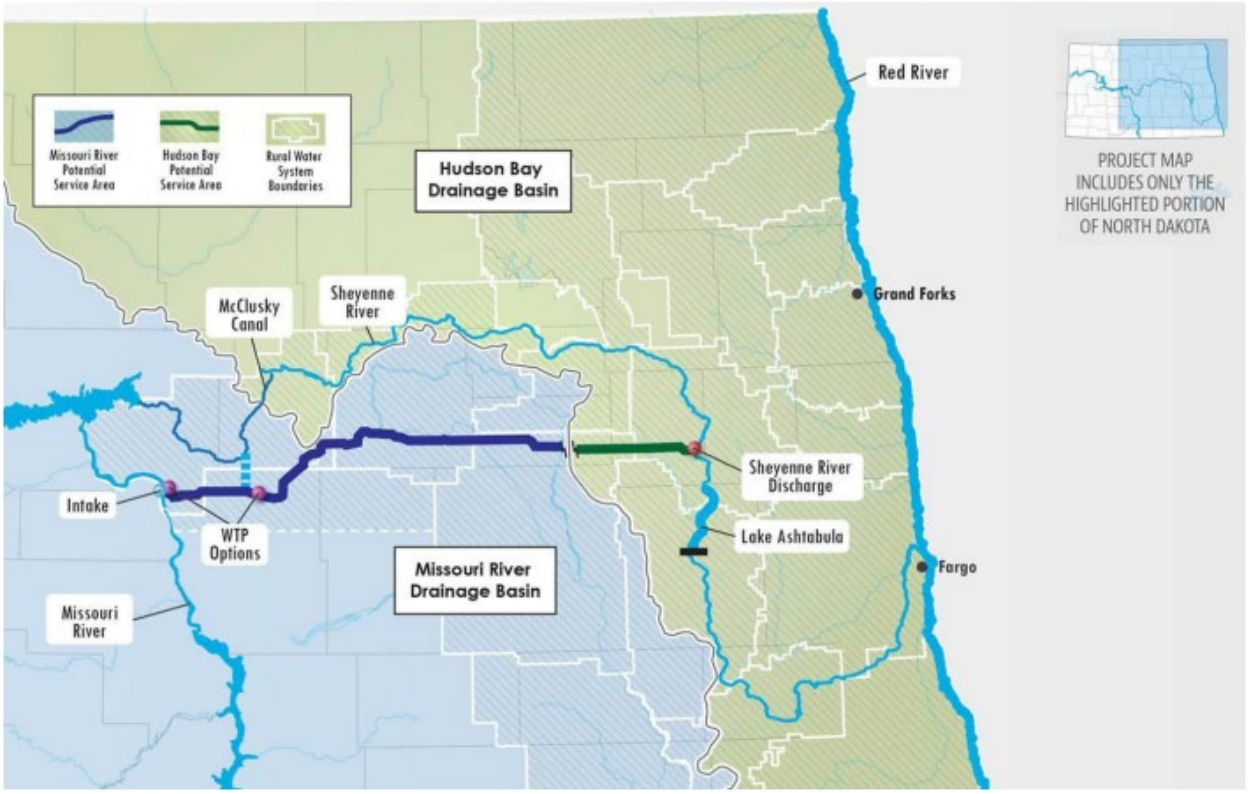
Source: North Dakota Department of Water Resources, 2021

E.3.5 Southwest Area Water Supply Projects



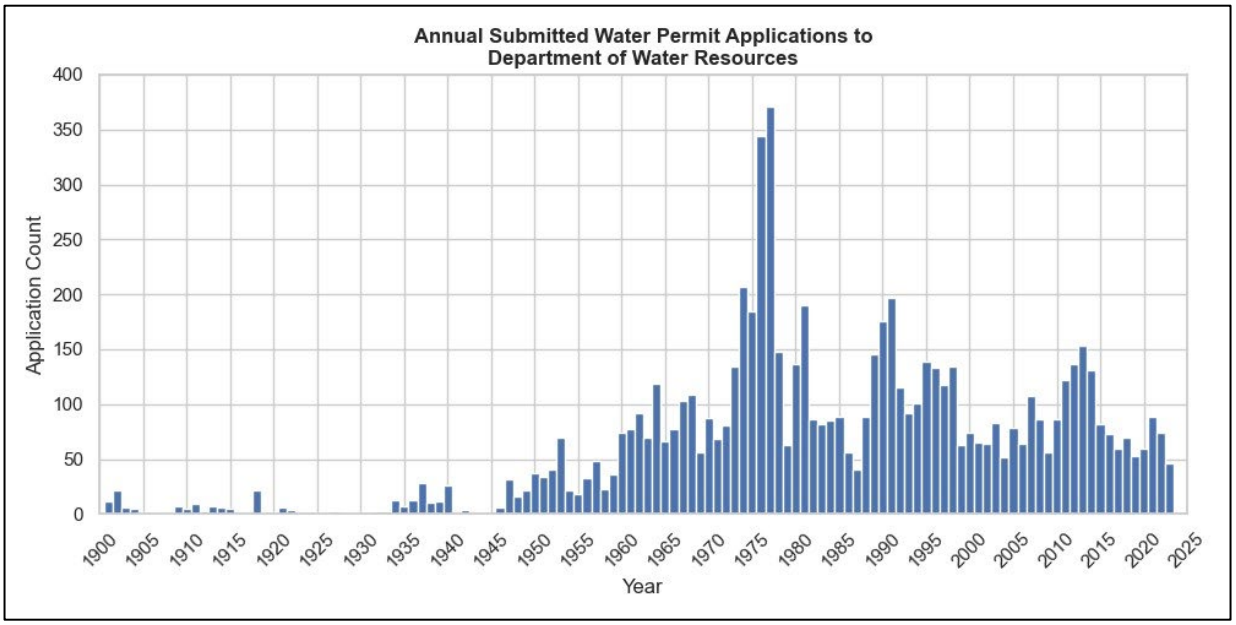
Source: North Dakota Department of Water Resources, 2021

E.3.6 Red River Water Supply Projects



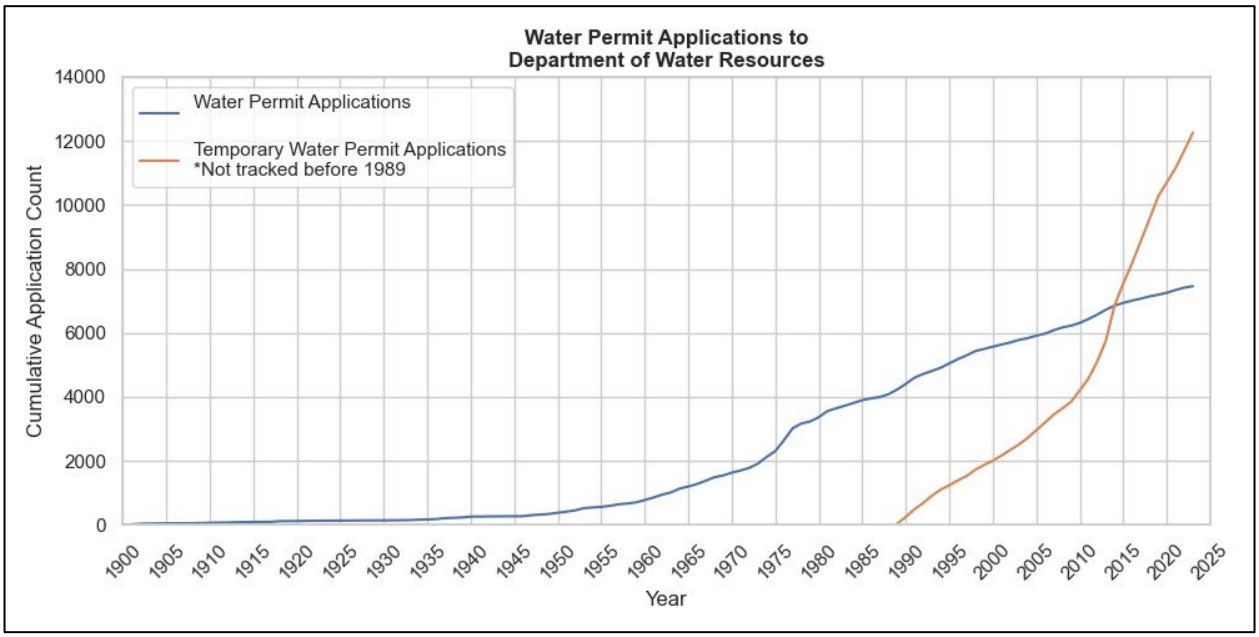
Source: North Dakota Department of Water Resources, 2021

E.3.7 Water Permit Applications



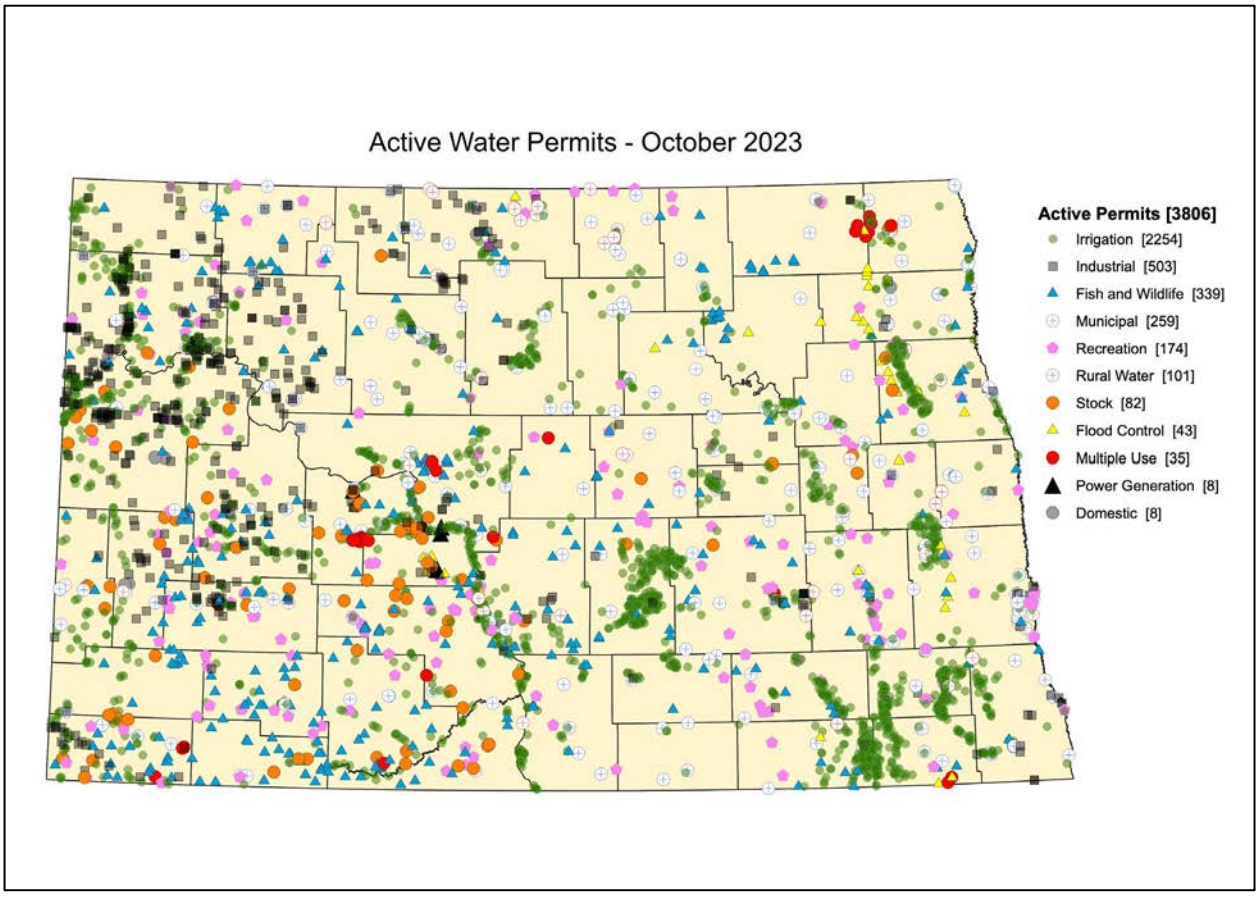
Source: North Dakota Department of Water Resources, 2023

E.3.8 Cumulative Count of Active Water Permits



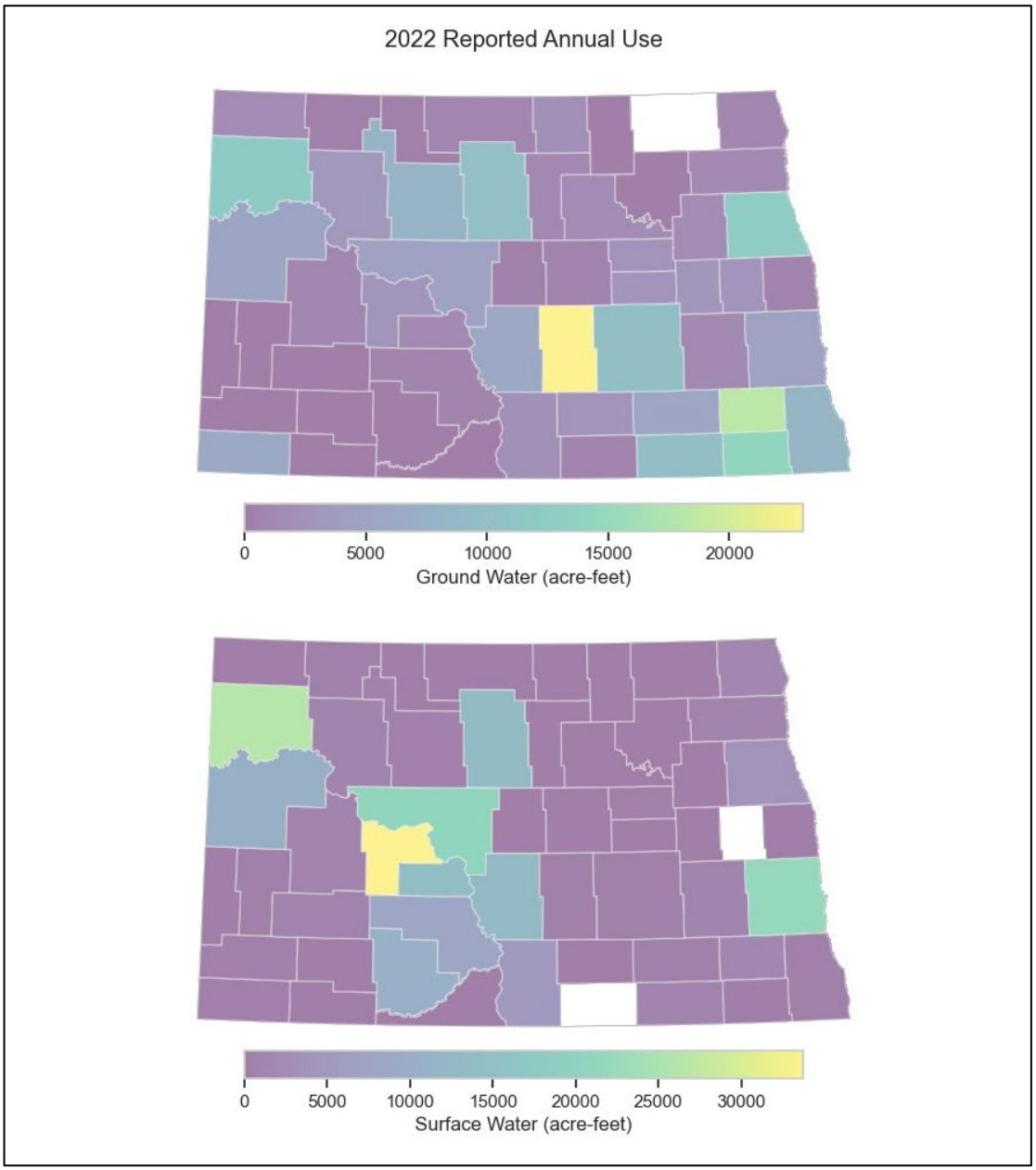
Source: North Dakota Division of Water Resources, 2023

E.3.9 Active Water Permits



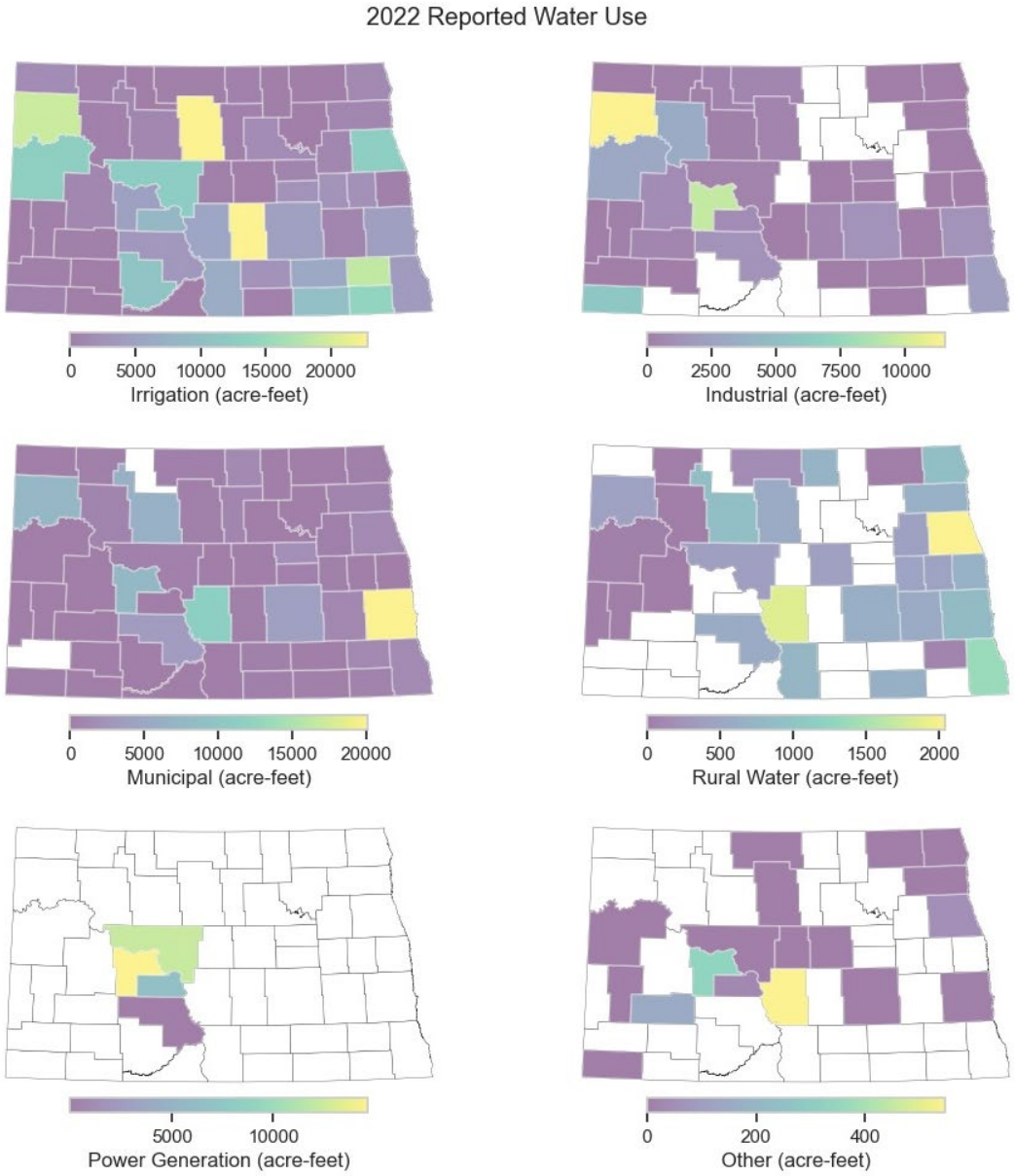
Source: North Dakota Division of Water Resources, 2023

E.3.10 Water Use by Source



Source: North Dakota Department of Water Resources, 2023

E.3.11 Reported Water Use by County



Source: North Dakota Department of Water Resources, 2023

E.3.12 Hazard Ranking by County

Plan	Ranking
Adams County	Moderate
Barnes County	High
Benson County	Moderate
Billings County[1]	Moderate
Bottineau County	Moderate
Bowman County[3]	High
Burke County[4]	Moderate
Burleigh County	Moderate
Cass County	Very High
Cavalier County	High
Dickey County	Moderate
Divide County[4]	Moderate
Dunn County[1]	Moderate
Eddy County[2]	High
Emmons County	High
Foster County	Moderate
Golden Valley County[1]	Moderate
Grand Forks County	Moderate
Grant County	High
Griggs County	High
Hettinger County	High
Kidder County	High
LaMoure County	Moderate
Logan County	High
McHenry County	Low
McIntosh County	Moderate
McKenzie County	Moderate
McLean County	Very High
Mercer County	Moderate
Morton County	High
Mountrail County	Moderate
Nelson County	High
Oliver County	High
Pembina County	Not Mentioned
Pierce County	Moderate
Ramsey County	Low
Ransom County	High
Renville County	Moderate
Richland County	High
Rolette County	Low

Plan	Ranking
Sargent County	Moderate
Sheridan County	High
Sioux County[5]	Moderate
Slope County[3]	High
Spirit Lake Nation	Moderate
Stark County[1]	Moderate
Standing Rock Sioux Tribe[5]	Moderate
Steele County	Moderate
Stutsman County	Moderate
Three Affiliated Tribes	Moderate
Towner County	Moderate
Traill County	Low
Turtle Mountain	Moderate
Walsh County	Low
Ward County	Low
Wells County[2]	High
Williams County	Moderate
City of Bismarck	Low

Source: Cumulation of data extracted from local and tribal plans

E.4 Cyberattack

E.4.1 Hazard Ranking by County

Plan	Ranking
Adams County	Moderate
Barnes County	Moderate
Benson County	Not Mentioned
Billings County[1]	Moderate
Bottineau County	Not Mentioned
Bowman County[3]	Not Mentioned
Burke County[4]	Not Mentioned
Burleigh County	High
Cass County	Not Mentioned
Cavalier County	Not Mentioned
Dickey County	Not Mentioned
Divide County[4]	Not Mentioned
Dunn County[1]	Moderate
Eddy County[2]	Not Mentioned
Emmons County	High
Foster County	Moderate
Golden Valley County[1]	Moderate
Grand Forks County	Very High
Grant County	Low
Griggs County	Very High
Hettinger County	Not Mentioned
Kidder County	Moderate
LaMoure County	Moderate
Logan County	Moderate
McHenry County	Not Mentioned
McIntosh County	Not Mentioned
McKenzie County	Moderate
McLean County	High
Mercer County	Moderate
Morton County	Low
Mountrail County	Low
Nelson County	Very High
Oliver County	Not Mentioned
Pembina County	Not Mentioned
Pierce County	Not Mentioned
Ramsey County	Not Mentioned
Ransom County	Moderate
Renville County	Not Mentioned
Richland County	Not Mentioned
Rolette County	Not Mentioned

Plan	Ranking
Sargent County	Not Mentioned
Sheridan County	Not Mentioned
Sioux County[5]	Not Mentioned
Slope County[3]	Not Mentioned
Spirit Lake Nation	Not Mentioned
Stark County[1]	Moderate
Standing Rock Sioux Tribe[5]	Not Mentioned
Steele County	Not Mentioned
Stutsman County	High
Three Affiliated Tribes	Moderate
Towner County	Moderate
Traill County	Not Mentioned
Turtle Mountain	Not Mentioned
Walsh County	High
Ward County	Not Mentioned
Wells County[2]	Not Mentioned
Williams County	Not Mentioned
City of Bismarck	Not Mentioned

Source: Cumulation of data extracted from local and tribal plans

E.5 Severe Winter Weather

E.5.1 Declared Disasters

Year	Declaration	Location	Casualties	Damages
1978	EM 3061	Adams, Billings, Bowman, Emmons, Golden Valley, Grant, Hettinger, Sioux, Slope	--	--
1997	DR 1157	Statewide	--	--
2004	EM3196	Burke, Dunn, McHenry, McKenzie, McLean, Mercer, Mountrail, Ward, Williams	--	$317,517
2005	DR 1616	Benson, Billings, Bottineau, Bowman, Burke, Dunn, Golden Valley, McHenry, McKenzie, McLean, Mercer, Oliver, Pierce, Renville, Rolette, Sheridan, Slope, Stark, Towner, Ward	--	$1,990,803
2005	DR 1621	Cass, Ransom, Richland, Sargent	--	$1,982,624
2010	DR 1879	Adams, Barnes, Billings, Bowman, Burke, Dickey, Dunn, Emmons, Golden Valley, Grant, Hettinger, Logan, McIntosh, McKenzie, Mercer, Morton, Mountrail, Oliver, Ransom, Renville, Sioux, Slope, Stark, Steele, Walsh	--	$12,773,947
2010	DR 1901	Adams, Benson, Burleigh, Grant, McHenry, McLean, Mercer, Morton, Oliver, Sheridan, Sioux, Wells	--	$26,651,652
2011	DR 1986	Bottineau, Burke, Divide, Dunn, McKenzie, Mountrail, Renville, Ward, Williams	--	$5,934,923
2020	DR 4154	Adams, Bowman, Grant, Hettinger, Morton, Sioux, Slope	--	$4,337,765
2022	DR 4660	Statewide	--	$42,154,336
2022	DR 4686	Dickey, Kidder, Mercer, Nelson, Ransom, Sargent, Wells	--	$280,175

E.5.2 Historic Occurrences

- **1886-1887 Winter:** Record-setting cold extended through the entire state. Two November blizzards followed by persistent temperatures below 0 degrees caused a devastating loss of cattle on the frontier territory (Wheeler, 2022). Many records from this winter still remain (Michael, 2009). People starved and froze to death, and snow stopped trains (Michael, 2009). Another massive blizzard hit in the end of January (Michael, 2009)
- **January 1888 Blizzard:** Known as the Schoolchildren's Blizzard, the January 12, 1888 event killed 235 people across the Great Plains, many children who were making their way home from school and underdressed for the weather as the storm hit with no warning after a 100-degree temperature swing in a single day (History.com, 2023).
- **March 1920 Blizzard:** A two-day blizzard maintained low visibility due to strong winds. A monument to 15-year-old Hazel Miner stands in front of the Oliver County Courthouse for her bravery in saving her siblings when their sleigh overturned in a coulee in Center. Although she did not survive the storm, her siblings did (State Historical Society, 2022).
- **March 1941 Blizzard:** Known as the Ides of March Blizzard, it devastated the Red River Valley, killing 38 in North Dakota, and 72 nationally (Briggs, 2021). What began as a spring day after a hard winter had brought many people out to enjoy the weather in spring clothes only to see it turn into a blustery snowstorm with winds up to 85 mph (Briggs, 2021). Many of the deaths occurred from people leaving stalled cars, prompting the now-common advice not to leave stalled vehicles during snowstorms (Briggs, 2021).
- **March 1966 Blizzard:** The early March Blizzard remains as one of the snowiest and persistent in North Dakota history. The three-day event dropped 20 to 30 inches of snow over the state, with drifts exceeding 40 feet in some locations (NOAA NWS Grand Forks, 2023). At least nine North Dakotans died, some from shoveling snow (NOAA NWS Grand Forks, 2023). Winds gusted up to 50 mph (NOAA NWS Grand Forks, 2023). The blizzard also killed more than 70,000 head of cattle and 50,000 sheep (Bonham, 2016).

Figure E.5.2.1: NDDOT employee near power lines, 1966

Source: NOAA NWS Grand Forks, 1966

- **January 1975 Blizzard:** Snowfalls of 4 to 8 inches across the state were met with 70-mph winds that kicked up dirt with the snow (Briggs, 2020). Power outages caused many Minnesota Vikings fans in the region to miss their team's Super bowl loss (Briggs, 2020). Fargo's airport lacked visibility for 20 hours (Briggs, 2020). The same storm in the South produced 45 tornadoes (Briggs, 2020).
- **February 1984 Blizzard:** With 60-mph winds and temperatures well below zero, 23 died, seven in the state, as 800 motorists were stranded (Thomas, 2020). Some died as snow

blocked car exhausts leading to carbon monoxide poisoning of stranded motorists, leading to changes in protocols that close roads earlier (Thomas, 2020).

- **1996-1997 Winter:** One of the snowiest in state history, there were 117 inches of snow that fell in Fargo, exceeding averages by 70 inches (Dura, 2022). November brought up to 36 inches of snow in Grant and Burleigh counties (Dura 2022). Ten blizzards hit the state that winter, including one in April, fueling a snowpack that would cause the 1997 floods (Dura, 2022). More than 100,000 head of cattle perished over the winter (NOAA NWS Bismarck, 2017).

Figure E.5.2.2: Bismarck, 1997

Source: Bismarck Tribune, 1997

- **April 1999 Ice Storm:** Lightning, then hail, then freezing rain and snow moved across the state (NOAA NWS Bismarck, 1999). Snow fell as heavily as 15 inches in McHenry County. Power outages from ice accumulation were widespread in the state (NOAA NWS Bismarck, 1999).
- **November 2000 Winter Storm and Tornadoes:** While five tornadoes touched down in the Bismarck-Mandan area, injuring two and damaging 42 homes, the western and northern parts of the state dealt with blizzard conditions with 50-mph winds and widespread power outages (KXNews, 2021). Snow continued for two days, and several were injured when a tour bus crashed in Bowman County (KXNews, 2021).
- **January 2004 Winter Storm:** Up to a foot of snow fell over the weekend along with freezing rain and sleet, creating dangerous highway conditions. Wind-blown snow reduced visibilities, and wind chill dropped to as low as 30-below (NOAA NWS Bismarck, 2004).
- **October 2005 Blizzard:** Western and northern North Dakota got an early winter storm with snow totals reaching up to 22 inches in Bowbells, Marshall, Manning and Dunn Center after an 80-degree drop in temperatures in some locations (NOAA NWS Bismarck, 2005). Winds exceeded 40 mph, as tree limbs and power lines snapped from the heavy snow as power outages extended across 13 counties (NOAA NWS Bismarck, 2005). Interstate 94 was closed west of Mandan, as many main highways in the western part of the state were rendered unpassable. No-travel advisories were issued in 28 counties, and the National Guard was called to assist with rescues (NOAA NWS Bismarck, 2005).
- **November 2005 Ice Storm:** A combination of snow, ice and winds weighed down power lines and made travel difficult in Southeast North Dakota (NOAA NWS Bismarck, 2005). Interstate 94 was closed east of Jamestown (NOAA NWS Bismarck, 2005). No-travel advisories were issued in Stutsman and Dickey counties (NOAA NWS Bismarck, 2005)
- **April 2006 Blizzard:** Wind gusts up to 59 mph and up to a foot of snow caused near-zero visibility in Western North Dakota. At least 184 power poles were damaged in Williams County alone (NOAA NWS Bismarck, 2006). Travel conditions led to fatal car accidents, and the timing caused the death of several newborn calves (NOAA NWS Bismarck, 2006)

- **January 2010 Blizzard:** A freezing fog swept across the state on the 18th, creating thick ice on power lines. Freezing drizzle followed on from January 20-22, thickening the ice on the system (NOAA NWS Bismarck, 2010). Snow and sleet began on January 22 before changing over to snow. Wind and snow continued until January 25th. Damage assessments estimated damage to the power system exceeding $20 million (NOAA NWS Bismarck, 2010).
- **April 2010 Winter Storm:** The Good Friday Storm devastated south and central North Dakota making travel difficult, and seriously damaging electrical structures (NOAA NWS Bismarck, 2010). What began as thunderstorms shifted to freezing rain, then sleet before becoming heavy wet snow (NOAA NWS Bismarck, 2010). More than $30 million in damage was done to electrical structures as 6 to 12 inches of heavy snow fell in Grant, Morton, Burleigh, McLean and Sheridan counties (NOAA NWS Bismarck, 2010).
- **April-May 2011 Winter Storm:** A late season storm in western and central North Dakota began as rain but shifted to freezing rain then heavy snow with wind gusts up to 75 mph (NOAA NWS Bismarck, 2011). Over $6.5 million in damage was done to the electrical utilities, and livestock losses were high as most herds had birthed their calves who were unequipped to deal with the conditions (NOAA NWS Bismarck, 2011). A fatality and injury were attributed to the storm from a vehicle crash in New England (NOAA NWS Bismarck, 2011).
- **April 2013 Winter Storm:** Snow fell as quickly as 2 inches per hour across western and central North Dakota, totaling as high as 22 inches in the James River Valley (NOAA NWS Bismarck, 2013). Bismarck received its largest single-day snowfall and heaviest April snow total due to the storm (NOAA NWS Bismarck, 2013). Interstate 94 was closed west of Jamestown and Highway 83 was closed from Bismarck to Underwood (NOAA NWS Bismarck, 2013).
- **October 2013 Winter Storm:** Southwest and southcentral North Dakota had an early season winter storm with more than 20 inches falling in Hettinger County but just light snow north of I-94. Winds exceeding 45 mph made evening traffic difficult as losses to power utilities, cattle, and unharvested crops were high (NOAA NWS Bismarck, 2013).

Figure E.5.2.3: Elgin, 2013

Source: NewsDakota, 2013

E.5.3 Events, Damages, Deaths and Injuries by County

County	Events	Deaths	Injuries	Property Damage	Crop Damage
Adams	89	0	0	$6,965,000	$0
Barnes	221	0	0	$6,322,000	$0
Benson	206	0	0	$12,019,000	$0
Billings	89	0	1	$4,344,000	$0
Bottineau	135	0	5	$5,935,000	$75,000
Bowman	90	0	7	$4,355,000	$0
Burke	115	0	1	$8,140,000	$0
Burleigh	102	1	8	$6,595,000	$0
Cass	226	0	0	$6,350,000	$0
Cavalier	214	0	0	$12,419,000	$0
Dickey	130	0	2	$6,321,000	$200,000
Divide	100	0	0	$12,153,000	$0
Dunn	109	0	3	$5,217,000	$0
Eddy	202	0	2	$12,019,000	$0
Emmons	100	2	2	$4,670,000	$0
Foster	136	1	1	$4,470,000	$0
Golden Valley	85	0	0	$3,541,000	$0
Grand Forks	230	0	0	$12,055,000	$0
Grant	100	0	3	$19,780,000	$0
Griggs	221	0	0	$12,007,000	$0
Hettinger	90	1	1	$5,836,000	$0
Kidder	114	0	9	$4,970,000	$0
La Moure	134	1	4	$5,755,000	$200,000
Logan	117	2	1	$4,633,000	$0
McHenry	137	0	0	$2,630,000	$0
McIntosh	116	1	0	$8,195,000	$0
McKenzie	102	2	5	$6,904,000	$0
McLean	121	1	6	$6,730,000	$0
Mercer	107	0	3	$3,503,000	$0
Morton	114	1	9	$23,183,000	$0
Mountrail	119	0	1	$12,984,000	$0
Nelson	217	0	1	$12,007,000	$0
Oliver	101	0	2	$4,571,000	$0
Pembina	226	1	0	$12,452,000	$0
Pierce	130	0	0	$2,290,000	$0
Ramsey	204	0	0	$6,464,000	$0
Ransom	212	0	0	$12,277,000	$0
Renville	131	0	0	$5,413,000	$0
Richland	215	0	0	$2,073,000	$0
Rolette	128	1	0	$6,280,000	$0
Sargent	205	0	0	$12,277,000	$0
Sheridan	121	0	1	$3,480,000	$0

County	Events	Deaths	Injuries	Property Damage	Crop Damage
Sioux	108	2	5	$12,072,000	$0
Slope	89	0	0	$4,185,000	$0
Stark	93	0	6	$4,510,000	$0
Steele	218	0	0	$6,007,000	$0
Stutsman	132	0	12	$5,540,000	$0
Towner	197	0	0	$12,419,000	$0
Traill	223	0	0	$12,008,000	$0
Walsh	399	0	0	$6,412,000	$0
Ward	129	4	14	$6,675,000	$0
Wells	135	1	0	$3,570,000	$0
Williams	105	5	9	$17,790,000	$0

Source: NCEI, 2023

E.5.4 Claims for Collapse on State Facilities

County	Claims
Cass	1
Ward	2
State	3

Source: North Dakota State Fire and Tornado Fund, 2023

E.5.5 Projected Population Change and Severe Winter Events

County	Events	2020	2040	Percent Change
Adams	89	2,368	2,081	-12.1%
Barnes	221	11,062	10,259	-7.3%
Benson	206	7,322	9,018	23.2%
Billings	89	987	1,217	23.3%
Bottineau	135	6,768	6,627	-2.1%
Bowman	90	3,367	3,603	7.0%
Burke	115	2,481	3,106	25.2%
Burleigh	102	97,770	114,018	16.6%
Cass	226	182,259	232,293	27.5%
Cavalier	214	3,771	3,344	-11.3%
Dickey	130	5,027	4,542	-9.6%
Divide	100	2,510	2,954	17.7%
Dunn	109	4,882	6,431	31.7%
Eddy	202	2,299	2,296	-0.1%
Emmons	100	3,324	2,978	-10.4%
Foster	136	3,336	3,291	-1.3%
Golden Valley	85	1,924	2,176	13.1%
Grand Forks	230	74,366	89,398	20.2%
Grant	100	2,392	2,286	-4.4%
Griggs	221	2,222	1,743	-21.6%
Hettinger	90	2,713	3,022	11.4%
Kidder	114	2,453	2,209	-9.9%
La Moure	134	4,106	3,872	-5.7%
Logan	117	1,912	1,935	1.2%
McHenry	137	6,125	6,848	11.8%
McIntosh	116	2,603	2,101	-19.3%
McKenzie	102	14,586	26,683	82.9%
McLean	121	9,894	10,570	6.8%
Mercer	107	8,930	8,675	-2.9%
Morton	114	31,621	36,254	14.7%
Mountrail	119	11,210	16,103	43.6%
Nelson	217	2,861	2,330	-18.6%
Oliver	101	1,902	1,931	1.5%
Pembina	226	6,974	5,829	-16.4%
Pierce	130	4,243	4,040	-4.8%
Ramsey	204	11,838	11,695	-1.2%
Ransom	212	5,438	5,180	-4.7%
Renville	131	2,595	2,674	3.0%
Richland	215	16,540	16,241	-1.8%
Rolette	128	15,629	18,641	19.3%
Sargent	205	3,899	3,740	-4.1%
Sheridan	121	1,292	1,114	-13.8%

County	Events	2020	2040	Percent Change
Sioux	108	4,748	6,231	31.2%
Slope	89	796	801	0.6%
Stark	93	34,170	45,825	34.1%
Steele	218	1,942	1,843	-5.1%
Stutsman	132	21,224	20,197	-4.8%
Towner	197	2,258	2,236	-1.0%
Traill	223	8,029	7,714	-3.9%
Walsh	399	10,975	10,470	-4.6%
Ward	129	76,184	94,378	23.9%
Wells	135	4,028	3,641	-9.6%
Williams	105	39,380	63,505	61.3%

Source: NCEI, 2023, U.S. Census Bureau, 2020

E.5.6 Hazard Ranking by County

Plan	Ranking
Adams County	High
Barnes County	Very High
Benson County	High
Billings County[1]	High
Bottineau County	Very High
Bowman County[3]	High
Burke County[4]	Very High
Burleigh County	Very High
Cass County	High
Cavalier County	High
Dickey County	High
Divide County[4]	Very High
Dunn County[1]	High
Eddy County[2]	High
Emmons County	Very High
Foster County	Moderate
Golden Valley County[1]	High
Grand Forks County	Very High
Grant County	High
Griggs County	High
Hettinger County	High
Kidder County	High
LaMoure County	High
Logan County	High
McHenry County	Moderate
McIntosh County	High
McKenzie County	High
McLean County	High
Mercer County	High
Morton County	Moderate
Mountrail County	High
Nelson County	High
Oliver County	High
Pembina County	Not Mentioned
Pierce County	High
Ramsey County	Moderate
Ransom County	High
Renville County	Very High
Richland County	High
Rolette County	Very High
Sargent County	High

Plan	Ranking
Sheridan County	High
Sioux County[5]	Moderate
Slope County[3]	High
Spirit Lake Nation	High
Stark County[1]	High
Standing Rock Sioux Tribe[5]	Moderate
Steele County	High
Stutsman County	High
Three Affiliated Tribes	High
Towner County	High
Traill County	Moderate
Turtle Mountain	High
Walsh County	High
Ward County	Low
Wells County[2]	High
Williams County	High
City of Bismarck	High

Source: Cumulation of data extracted from local and tribal plans

E.6 Severe Summer Weather

E.6.1 Declared Disasters

Year	Declaration	Location	Casualties	Damages
1978	EM 3065	Grant	--	--
1994	DR 1032	Barnes, Benson, Eddy, Foster, Griggs, Hettinger, Kidder, LaMoure, Logan, McIntosh, McKenzie, Nelson, Oliver, Pierce, Ramsey, Richland, Rolette, Sargent, Sheridan, Steele, Stutsman, Towner, Walsh, Wells, Williams	--	--
1995	DR 1050	Statewide	--	--
1996	DR 1118	Statewide	--	--
2000	DR 1334	Statewide	--	$39,700,101
2002	DR 1431	Grand Forks, Pembina, Stutsman, Traill, Walsh	--	$1,143,690
2003	DR 1483	Barnes	--	$868,596
2004	DR 1515	Benson, Bottineau, Burke, Cavalier, Eddy, Grand Forks, Griggs, McHenry, Mountrail, Nelson, Pembina, Pierce, Ramsey, Renville, Steele, Towner, Traill, Walsh, Ward	--	$12,621,672
2005	DR 1597	Benson, Bottineau, Cavalier, Dickey, Grand Forks, Griggs, Kidder, LaMoure, McHenry, Mountrail, Nelson, Pembina, Pierce, Ramsey, Ransom, Renville, Richland, Rolette, Sargent, Sioux, Stark, Steele, Towner, Traill, Walsh, Ward	--	$14,394,156
2006	DR 1645	Cass, Cavalier, Grand Forks, Pembina, Ransom, Richland, Rolette, Sargent, Towner, Traill, Walsh	--	$7,378,304
2007	DR 1713	Barnes, Bowman, Cass, Cavalier, Dickey, Grant, La Moure, Logan, McHenry, Ransom, Richland, Sargent, Stutsman	--	$2,939,821
2007	DR 1726	Grand Forks	--	$7,797,703
2007	DR 1725	Cass, Steele	--	$719,520
2009	DR 1829	Statewide--	--	$114,432,778
2013	DR 4128	Benson, Bottineau, Cavalier, Dunn, Kidder, McHenry, McKenzie, McLean, Mountrail, Nelson, Pembina, Pierce, Ramsey, Sheridan, Spirit Lake Reservation, Stark, Towner, Turtle Mountain Reservation, Walsh, Ward, Wells	--	$10,340,133
2020	DR 4565	Benson, Grand Forks, McKenzie, Mountrail, Nelson, McKenzie	--	$2,573,886
2021	DR 4613	Burke, Divide, Emmons, Grant, Kidder, LaMoure, McKenzie, Sioux, Williams	--	$2,723,209

Source: FEMA, 2023

E.6.2 Historic Occurrences

Downbursts

- **July and August 1919 Severe Storms** in the state brought hail to Buxton and killed a Linton resident. Northwest counties were hit particularly hard (Oakes Journal, 1919). In Williston, several small buildings were blown down, and the county grandstand was destroyed. Communications and power lines were blown down. At least five were killed (Divide County Journal, 1916).
- **June 2005 Severe Storms:** The state requested a disaster declaration in 20 counties and two tribal areas for $13 million in damage to power structures, roads and bridges (Sargent County Teller, 2005). Six inches of rain in Souris flooded the western side of town, seriously damaging eight structures (Wagar, 2005).
- **July 2006 Severe Storms:** Much-needed rain came with heavy winds, overturning grain bins, damaging roofs and out structures near Balta (Atkinson-Sattler, 2006). Coleharbor in McLean County, was hit with a downburst that exceeded 100 mph. Two were injured when their camper was rolled in the downburst, and a weather station was destroyed (Ryen, 2006).
- **July 2007 Severe Storms:** In Slope County, a construction site was disassembled by the storm. Near Marmarth, a grain bin, roofs and horse trailers were damaged (NCEI, 2007). Out structures were damaged near Belfield, and a 70-foot-tall tree fell over onto a house in Richardton (NCEI, 2007). The Williston Airport had buildings and small aircraft damaged, including three hangars and electrical structures (NCEI, 2007). With 105-mph winds in LaMoure, farmstead buildings were damaged (NCEI, 2007). The Western Area Power Administration lost 36 electrical towers between Jamestown and Fargo, and Minnkota Power Cooperative lost 49 transmission towers. From Hope to McLeod in Steele and Ransom Counties experienced heavy wind damage (Insurance Journal, 2007).

E.6.2.1: Williston Airport, 2007

Source: Leann Eckroth/Williston Herald, 2007

- **July 2011 Downburst:** Winds reaching as high as 95 mph tore up roofing, sheet metal and sidewalls, and partially collapsed grain bins in northeast North Dakota (NOAA NWS Grand Forks, 2011).
- **June 2016 Downburst Winds:** A wind-fueled thunderstorm cell crossed the state. Vinyl siding and hail damage occurred in Crosby (NOAA NWS Bismarck, 2016). Power poles were downed in Mountrail County (NOAA NWS Bismarck, 2016). Tolley suffered a power outage. In Bottineau County, the city of Lansford, had significant damage, including damage to mobile homes, single-family homes and grain elevators as microburst windspeeds reached 100 mph in the town (NOAA NWS Bismarck, 2016).

Hail

- **August 1995 Hail:** A hailstorm in western North Dakota caused about 59,000 acres of cropland in Mountrail County alone to be lost (Swanson, 1995). Car windshields and windows, poorly constructed buildings and outbuildings were damaged in Parshall and New Town (Swanson, 1995). The 4 Bears Casino and Lodge lost power for three hours and lost neon lights to the 2.5-inch hailstorm (Swanson, 1995).
- **June 2001 Hail:** Beginning in Burt in Hettinger County, hail and high winds caused damage. A 3-mile path of hail damage was left behind near Burt and Manning with hailstones as large as 2.0 inches. The stones had grown to 2.75 inches by the time the storm reached Mandan and Bismarck, causing about $260 million in damage in the two cities (NOAA NWS Bismarck, 2001). More insurance claims were filed for this storm than even the 1997 Red River Floods with 60,000 claims (Hoffman, 2012).
- **June 2005 Hail:** Baseball-sized hail and 84-mph winds damaged businesses, vehicles and homes in Dickinson. Further west, high-voltage transmission lines were taken out by the hail and winds near Silva in Pierce County (NOAA NWS Bismarck, 2005).

E.6.2.2: Hailstone from Prairie Knights Casino, Sioux Co.
Source: Tom Stromme/Bismarck Tribune

- **June 2010 Hail:** Southern North Dakota from Bowman County to Minnesota faced hail and thunderstorms with 50 mph winds. Logan and Richland County had significant power structure damage. The Prairie Knights Casino was damaged by hail that approached softball size, large enough to break windows and have hailstones enter people's homes (Coleman, 2010).
- **June 2016 Hail:** Stones as large as 3 inches fell in central and western North Dakota, which combined with heavy rains and winds to create problems across the region. Winds took out power poles near Alexander in McKenzie County and shut down the internet in areas of the county, including the county courthouse, where there was also hail damage (Schlecht, 2016). Powerlines between Hazelton and Napoleon and between Wishek and Bismarck were downed (Schlecht, 2016). Logan County had downed grain silos and destroyed outbuildings (Schlecht, 2016). The Southwest Water Authority lost power at its intake and had to issue a water conservation advisory (Schlecht, 2016).
- **July 2016 Hail:** Hail exceeding 3 inches in diameter damaged siding, vehicles, windows and roofs in and near Kildeer (Edman, 2016). In a nursing home, a skylight was shattered by a hailstone allowing rain and hail to enter the facility. Hail around town was as much as 1 foot deep (Erdman, 2016). Fairfield and Amidon also had significant damages (Erdman, 2016).

High Wind

- **July 2000 High Winds:** Twelve construction workers on a three-story apartment construction site took shelter in the structure which subsequently collapsed, causing 11 injuries and one death from cardiac arrest. Damages were estimated at $3 million (NCEI, 2000)
- **June 2008 High Winds:** Thunderstorm winds made their way through the state. In Ashley in McIntosh County, there was roof damage. The Jamestown Airport recorded winds up to 75-mph without rain. In Litchville and Valley City grain bins and power structures were blown down and outages were sporadic (NCEI, 2008)

Lightning

- **August 1996 Lightning:** A Dickinson 12-unit condominium caught fire from a lightning strike, displacing 24 people (NOAA NWS, 1996).
- **July 1997 Lightning:** Lightning in the state burned down two barns on a farm near Regent (NOAA NWS Bismarck, 1997) Lightning striking a tree killed 19 cattle huddled underneath near Rugby (NOAA NWS Bismarck, 1997)
- **August 2006 Lightning:** A lightning strike set two saltwater tanks near oil wells near Lignite ablaze with crews unable to begin suppression due to the high heat (NOAA NWS Bismarck, 2006). Property loss was around $250,000 with $15,000 estimated production losses per day. Also in Lignite, a pickup truck was struck with two occupants inside. Neither was injured, but the light came on, the radio blared, the antenna blasted off the mount and there was burn damage to the roof of the vehicle. The electrical system of the truck was destroyed (NOAA NWS Bismarck, 2006). Lightning from the same storm struck a power line near the former Mylo Town Hall, catching the structure on fire (NOAA NWS Bismarck, 2006).
- **May-June 2013:** Five oilfield fires are attributed to lightning, causing spills of oil and saltwater in McKenzie County (Dalrymple, 2013)

Tornado

- **June 1957 Fargo:** The most destructive tornado in the state was in 1957 in Fargo, the June 20 tornado that would help create the Fujita scale. The storm was 9 miles long and 700 feet wide with a 70-mile intermittent path of damage that began in Buffalo (NOAA NWS Grand Forks, 2007). The funnel cloud was one of five in the supercell thunderstorm, and the storm produced tornadoes for at least 4 hours of its six-hours as a mature storm (NOAA NWS Grand Forks, 2007). Debris from Fargo traveled at least 50 miles, and advance warning allowed many in Fargo to evacuate the path due to the funnel's long track despite the lack of modern radar (NOAA NWS Grand Forks, 2007). The Golden Ridge neighborhood of Fargo was devastated, where six children in one family perished in the storm that had a total of

Figure E.6.2.3 Fargo, 1957

Source: Chet Gebert/Fargo Forum, 1957

12 fatalities, and 150 were injured (Springer, 2017). In total 66 blocks in Fargo were destroyed, including one high school, two grade schools, 1,364 homes, for an estimated $174 million in damage (Springer, 2017). More than 2,000 people were left homeless from the storm (Springer, 2017). The other tornadoes from this storm impacted Wheatland, Casselton, Glyndon, Mn and Dale, Mn (Springer, 2017). Two other F5s occurred in the state – all in the 1950s. In May 1953, two F5s touched down. One did no harm, and the other destroyed the community of Fort Rice, destroying the church, general store, and 16 homes. Two were killed and another 20 were hospitalized (NOAA NWS Bismarck, 2023).

- **May 1964 Emmons County:** The longest tornado in North Dakota history travelled 47.5 miles but caused no death or injuries; the second longest, in June 1975, in Hettinger County traveled 45.8 miles, injuring four and killing one (Fargo Forum, 2018).
- **June 1986 Bottineau County:** The widest tornado in North Dakota occurred in Bottineau County in 1986. It was 3 miles wide and traveled for 8 miles on the ground (NCEI, 1986). At least 8 farms were impacted, and a pregnant woman in a mobile home was injured. Her unborn child was unharmed, but her dog was killed in the storm (NCEI, 1986).
- **July 1997:** An F2 tornado between Carpio and Greene in Renville County struck a farmhouse, blowing it off the foundation. A baby and elderly man were injured, and an elderly woman died from injuries sustained from being trapped by debris (NOAA NWS Bismarck, 1997).
- **March 26, 2003 Edmunds:** A F0 tornado along Pipestem Creek in Stutsman County represents the earliest touchdown of a tornado in a year (NCEI, 2003)
- **August 2007 Northwood:** At least a dozen tornadoes were spawned from a supercell that traveled over eastern North Dakota. An EF4 struck Northwood in Grand Forks County, killing one and injuring 18 (NOAA NWS Grand Forks, 2007). Nearly every structure in the town was impacted by the wide funnel, causing $60 million in damages (NOAA NWS Grand Forks, 2007). The storm was on the ground for 5 miles with the town in the middle of its path, and became as wide as 0.8 mile with multiple funnels active at once (NOAA NWS Grand Forks, 2007). This represents the latest in the season for a damaging tornado, although there have been EF2s as late as November in the state (NOAA NWS Grand Forks, 2007).

E.6.2.4 Northwood, 2007

Source: Grand Forks Herald, 2007

- **July 2009 Tornado Dickinson:** The tornado was an EF3 exceeding 150 mph that damaged more than 400 homes in and near Dickinson, causing more than $20 million in damage (Horn, 2019). The rain-wrapped storm completely destroyed 100 homes south of the Heart River and caused power outages for most of Dickinson (NCEI, 2009).
- **July 2018 Watford City:** An EF2 hit a recreational vehicle (RV) park, killing a one-week-old baby, injuring 12, and displacing 200 in the RV park that was mostly housing oil workers and their families (Fargo Forum, 2018).

E.6.3 Events, Deaths, Injuries, and Damages by County

County	Events	Deaths	Injuries	Damages
Adams	73	0	0	$2,426,000
Barnes	118	0	1	$22,071,250
Benson	74	0	0	$10,798,250
Billings	50	0	1	$1,584,000
Bottineau	73	0	10	$9,931,030
Bowman	64	0	1	$2,362,280
Burke	56	0	0	$3,493,530
Burleigh	100	1	40	$13,826,730
Cass	178	12	128	$235,981,480
Cavalier	79	1	3	$11,610,200
Dickey	69	0	2	$7,272,280
Divide	31	0	0	$1,080,530
Dunn	67	0	1	$1,781,500
Eddy	52	0	0	$1,938,500
Emmons	73	0	3	$5,023,780
Foster	36	0	0	$15,276,530
Golden Valley	41	0	3	$1,193,000
Grand Forks	145	1	35	$72,013,390
Grant	93	5	37	$7,526,780
Griggs	62	0	0	$14,164,980
Hettinger	82	1	4	$6,473,000
Kidder	58	0	1	$8,194,060
La Moure	70	2	3	$7,209,780
Logan	59	0	9	$3,205,000
McHenry	66	0	0	$3,338,000
McIntosh	51	0	0	$3,013,600
McKenzie	71	1	38	$14,645,560
McLean	89	1	15	$9,422,280
Mercer	49	0	3	$2,966,000
Morton	125	3	25	$12,214,530
Mountrail	75	0	2	$3,087,530
Nelson	61	0	0	$858,400
Oliver	39	0	1	$866,500
Pembina	78	0	9	$5,120,300
Pierce	39	0	0	$4,427,030
Ramsey	84	0	17	$19,153,010
Ransom	54	0	8	$17,280,150
Renville	55	1	4	$2,692,000
Richland	98	2	32	$6,601,250
Rolette	36	1	3	$3,209,530
Sargent	44	0	0	$25,308,500

County	Events	Deaths	Injuries	Damages
Sheridan	46	0	1	$1,932,000
Sioux	44	0	10	$1,521,500
Slope	49	0	0	$1,760,560
Stark	94	1	2	$26,487,000
Steele	58	0	4	$52,096,390
Stutsman	102	0	9	$19,374,000
Towner	50	0	0	$760,700
Traill	57	0	1	$5,523,000
Walsh	99	0	2	$4,296,730
Ward	117	1	2	$5,833,560
Wells	49	0	1	$2,804,500
Williams	79	1	1	$5,565,500

Source: NCEI, 2023

E.6.4 Hazard Ranking by County

Plan	Ranking
Adams County	High
Barnes County	Very High
Benson County	High
Billings County[1]	High
Bottineau County	Very High
Bowman County[3]	High
Burke County[4]	Very High
Burleigh County	High
Cass County	High
Cavalier County	High
Dickey County	High
Divide County[4]	Very High
Dunn County[1]	High
Eddy County[2]	High
Emmons County	High
Foster County	Moderate
Golden Valley County[1]	High
Grand Forks County	Very High
Grant County	High
Griggs County	High
Hettinger County	High
Kidder County	High
LaMoure County	High
Logan County	High
McHenry County	Moderate
McIntosh County	High
McKenzie County	High
McLean County	High
Mercer County	High
Morton County	Moderate
Mountrail County	Moderate
Nelson County	High
Oliver County	High
Pembina County	Not Mentioned
Pierce County	High
Ramsey County	Moderate
Ransom County	High
Renville County	Very High
Richland County	High
Rolette County	Very High
Sargent County	High

Plan	Ranking
Sheridan County	High
Sioux County[5]	Moderate
Slope County[3]	High
Spirit Lake Nation	High
Stark County[1]	High
Standing Rock Sioux Tribe[5]	Moderate
Steele County	High
Stutsman County	High
Three Affiliated Tribes	High
Towner County	High
Traill County	Low
Turtle Mountain	Not Mentioned
Walsh County	High
Ward County	Low
Wells County[2]	High
Williams County	High
City of Bismarck	Moderate

Source: Cumulation of data extracted from local and tribal plans

E.7 Infectious Disease and Pest Infestation

E.7.1 Children and Elderly by County

County	Under 18	65 and Over	Total Population	Percent Children or Elderly
Adams County	515	595	2,237	49.60%
Barnes County	2,173	2,399	10,869	42.10%
Benson County	2,204	818	6,090	49.60%
Billings County	192	202	839	47.00%
Bottineau County	1,417	1,486	6,442	45.10%
Bowman County	748	663	3,024	46.70%
Burke County	565	424	2,177	45.40%
Burleigh County	23,172	15,833	97,895	39.80%
Cass County	41,482	22,280	182,992	34.80%
Cavalier County	819	1,018	3,725	49.30%
Dickey County	1,223	1,018	5,013	44.70%
Divide County	505	542	2,196	47.70%
Dunn County	937	720	4,054	40.90%
Eddy County	533	637	2,378	49.20%
Emmons County	636	952	3,316	47.90%
Foster County	773	766	3,396	45.30%
Golden Valley County	377	418	1,812	43.90%
Grand Forks County	15,626	9,291	73,101	34.10%
Grant County	516	700	2,351	51.70%
Griggs County	462	677	2,242	50.80%
Hettinger County	513	594	2,502	44.20%
Kidder County	605	556	2,397	48.40%
LaMoure County	970	1,093	4,173	49.40%
Logan County	379	502	1,814	48.60%
McHenry County	1,289	1,119	5,420	44.40%
McIntosh County	465	789	2,568	48.80%
McKenzie County	4,460	1,200	13,762	41.10%
McLean County	2,179	2,295	9,788	45.70%
Mercer County	1,957	1,677	8,405	43.20%
Morton County	7,626	5,407	32,916	39.60%
Mountrail County	2,791	1,088	9,717	39.90%
Nelson County	619	787	3,035	46.30%
Oliver County	465	444	1,850	49.10%
Pembina County	1,491	1,630	6,912	45.20%
Pierce County	918	946	4,038	46.20%
Ramsey County	2,794	2,374	11,638	44.40%
Ransom County	1,304	1,175	5,679	43.70%
Renville County	602	409	2,328	43.40%
Richland County	3,701	2,966	16,546	40.30%

County	Under 18	65 and Over	Total Population	Percent Children or Elderly
Rolette County	4,294	1,438	12,508	45.80%
Sargent County	808	857	3,839	43.40%
Sheridan County	218	425	1,328	48.40%
Sioux County	1,471	321	3,993	44.90%
Slope County	157	198	775	45.80%
Stark County	8,954	4,237	32,710	40.30%
Steele County	424	445	1,870	46.50%
Stutsman County	4,460	4,145	21,678	39.70%
Towner County	479	533	2,190	46.20%
Traill County	1,836	1,549	8,008	42.30%
Walsh County	2,473	2,221	10,631	44.20%
Ward County	16,639	8,794	69,686	36.50%
Wells County	880	1,011	4,031	46.90%
Williams County	11,362	3,534	38,460	38.70%
Total	**184,458**	**118,198**	**773,344**	**39.10%**

Source: American Community Survey, 2021 5-year estimates

E.7.2 Cumulative COVID-19 Cases

County	Covid Cases	Infection Rate
Adams	696	0.32
Barnes	3,743	0.34
Benson	2,309	0.39
Billings	170	0.18
Bottineau	1,907	0.3
Bowman	938	0.31
Burke	496	0.23
Burleigh	41,598	0.42
Cass	71,957	0.39
Cavalier	996	0.27
Dickey	1,832	0.37
Divide	610	0.28
Dunn	1,204	0.29
Eddy	901	0.38
Emmons	845	0.26
Foster	1,177	0.35
Golden Valley	516	0.3
Grand Forks	27,361	0.37
Grant	557	0.24
Griggs	691	0.3
Hettinger	966	0.39
Kidder	604	0.25
LaMoure	1,188	0.29
Logan	562	0.3
McHenry	1,592	0.3
McIntosh	903	0.36
McKenzie	3,676	0.25
McLean	3,217	0.33
Mercer	3,053	0.37
Morton	13,409	0.4
Mountrail	3,961	0.4
Nelson	938	0.31
Oliver	379	0.2
Pembina	2,428	0.35
Pierce	1,258	0.32
Ramsey	4,434	0.38
Ransom	1,959	0.34
Renville	674	0.3
Richland	4,856	0.29
Rolette	8,204	0.67
Sargent	1,334	0.35

County	Covid Cases	Infection Rate
Sheridan	347	0.27
Sioux	1,709	0.44
Slope	74	0.1
Stark	13,952	0.41
Steele	447	0.25
Stutsman	8,387	0.39
Towner	762	0.35
Traill	2,541	0.32
Walsh	4,169	0.39
Ward	24,378	0.35
Wells	1,225	0.31
Williams	12,400	0.3
Total	**290,490**	**0.33**

Source: North Dakota Department of Health and Human Services, 2023

E.7.3 Hazard Ranking by County

Plan	Ranking
Adams County	Moderate
Barnes County	Moderate
Benson County	Low
Billings County[1]	Moderate
Bottineau County	High
Bowman County[3]	Moderate
Burke County[4]	Low
Burleigh County	High
Cass County	Not Mentioned
Cavalier County	Moderate
Dickey County	High
Divide County[4]	Low
Dunn County[1]	Moderate
Eddy County[2]	Moderate
Emmons County	High
Foster County	Moderate
Golden Valley County[1]	Moderate
Grand Forks County	High
Grant County	High
Griggs County	Very High
Hettinger County	Moderate
Kidder County	High
LaMoure County	Moderate
Logan County	High
McHenry County	Moderate
McIntosh County	Moderate
McKenzie County	Moderate
McLean County	Moderate
Mercer County	Moderate
Morton County	Moderate
Mountrail County	Moderate
Nelson County	Very High
Oliver County	Moderate
Pembina County	High
Pierce County	Low
Ramsey County	Moderate
Ransom County	Moderate
Renville County	Low
Richland County	High
Rolette County	High
Sargent County	High

Plan	Ranking
Sheridan County	Moderate
Sioux County[5]	Moderate
Slope County[3]	Moderate
Spirit Lake Nation	Low
Stark County[1]	Moderate
Standing Rock Sioux Tribe[5]	Moderate
Steele County	Moderate
Stutsman County	High
Three Affiliated Tribes	Not Mentioned
Towner County	Moderate
Traill County	Low
Turtle Mountain	Moderate
Walsh County	Moderate
Ward County	Low
Wells County[2]	Moderate
Williams County	Low
City of Bismarck	Moderate

Source: Cumulation of data extracted from local and tribal plans

E.8 Dam Failure

E.8.1 Dam Failure Vulnerability Analysis

County	Medium Hazard Dams (1 pt)	High Hazard Dams (2 pt)	Med+High Hazard Dams without EAPs (1 pt)	Vulnerability Score
Adams County	2		1	3
Barnes County		2		4
Benson County		10		20
Billings County				0
Bottineau County				0
Bowman County		1		2
Burke County	2			2
Burleigh County	1	1		3
Cass County	5	3		11
Cavalier County	5	1	1	8
Dickey County	1			1
Divide County				0
Dunn County	1	1	1	4
Eddy County				0
Emmons County	1			1
Foster County				0
Golden Valley, County	1	1	1	4
Grand Forks County	3	5		13
Grant County	1	1		3
Griggs County				0
Hettinger County	1	1		3
Kidder County				0
LaMoure County	1		1	2
Logan County				0
McHenry County				0
McIntosh County				0
McKenzie County	3		3	6
McLean County	1	1		3
Mercer County		1		2
Morton County	2	1		4
Mountrail County		1		2
Nelson County	3			3
Oliver County	3	2	2	9
Pembina County	4	2		8
Pierce County				0
Ramsey County		1	1	3
Ransom County	1			1
Renville County				0

County	Medium Hazard Dams (1 pt)	High Hazard Dams (2 pt)	Med+High Hazard Dams without EAPs (1 pt)	Vulnerability Score
Richland County				0
Rolette County		2		4
Sargent County	2			2
Sheridan County				0
Sioux County		1		2
Slope County				0
Stark County	1	2	2	7
Steele County	3			3
Stutsman County		2		4
Towner County	2		1	3
Traill County	1			1
Walsh County	5	3	1	12
Ward County	1	1		3
Wells County	1			1
Williams County	3	2	1	8

Source: North Dakota Department of Water Resources, 2023

E.8.2 Population Change and Dam Vulnerability

County	Vulnerability Score	2020	2040	Percent Change
Adams County	3	2,368	2,081	-12.10%
Barnes County	4	11,062	10,259	-7.30%
Benson County	20	7,322	9,018	23.20%
Billings County	0	987	1,217	23.30%
Bottineau County	0	6,768	6,627	-2.10%
Bowman County	2	3,367	3,603	7.00%
Burke County	2	2,481	3,106	25.20%
Burleigh County	3	97,770	114,018	16.60%
Cass County	11	182,259	232,293	27.50%
Cavalier County	8	3,771	3,344	-11.30%
Dickey County	1	5,027	4,542	-9.60%
Divide County	0	2,510	2,954	17.70%
Dunn County	4	4,882	6,431	31.70%
Eddy County	0	2,299	2,296	-0.10%
Emmons County	1	3,324	2,978	-10.40%
Foster County	0	3,336	3,291	-1.30%
Golden Valley, County	4	1,924	2,176	13.10%
Grand Forks County	13	74,366	89,398	20.20%
Grant County	3	2,392	2,286	-4.40%
Griggs County	0	2,222	1,743	-21.60%
Hettinger County	3	2,713	3,022	11.40%
Kidder County	0	2,453	2,209	-9.90%
LaMoure County	2	4,106	3,872	-5.70%
Logan County	0	1,912	1,935	1.20%
McHenry County	0	6,125	6,848	11.80%
McIntosh County	0	2,603	2,101	-19.30%
McKenzie County	6	14,586	26,683	82.90%
McLean County	3	9,894	10,570	6.80%
Mercer County	2	8,930	8,675	-2.90%
Morton County	4	31,621	36,254	14.70%
Mountrail County	2	11,210	16,103	43.60%
Nelson County	3	2,861	2,330	-18.60%
Oliver County	9	1,902	1,931	1.50%
Pembina County	8	6,974	5,829	-16.40%
Pierce County	0	4,243	4,040	-4.80%
Ramsey County	3	11,838	11,695	-1.20%
Ransom County	1	5,438	5,180	-4.70%
Renville County	0	2,595	2,674	3.00%
Richland County	0	16,540	16,241	-1.80%
Rolette County	4	15,629	18,641	19.30%
Sargent County	2	3,899	3,740	-4.10%

County	Vulnerability Score	2020	2040	Percent Change
Sheridan County	0	1,292	1,114	-13.80%
Sioux County	2	4,748	6,231	31.20%
Slope County	0	796	801	0.60%
Stark County	7	34,170	45,825	34.10%
Steele County	3	1,942	1,843	-5.10%
Stutsman County	4	21,224	20,197	-4.80%
Towner County	3	2,258	2,236	-1.00%
Traill County	1	8,029	7,714	-3.90%
Walsh County	12	10,975	10,470	-4.60%
Ward County	3	76,184	94,378	23.90%
Wells County	1	4,028	3,641	-9.60%
Williams County	8	39,380	63,505	61.30%

Source: North Dakota Department of Water Resources, 2023; U.S. Census Bureau, 2020

E.8.3 High Hazard Potential Dam Summary

Dam Name	NID ID	Owner Names	Owner Types	Downstream Communities at Risk
Acorn Ridge	ND01072	City of Devils Lake	Local Government	Devils Lake, Darby, Grand Harbor
Baldhill Dam	ND00309	USACE - St. Paul District	Federal	Valley City, North Valley City
Beach Dam	ND00503	City of Beach	Local Government	Beach
Beulah Flood Control Dam	ND00493	City of Beulah	Local Government	Beulah
Bowman-Haley Dam	ND00147	USACE - Omaha District	Federal	Haley
Bylin Dam	ND00036	Walsh County WRB	Local Government	Rural Adams Twp.
Clausen Springs Dam	ND00029	Barnes County WRB	Local Government	Kathryn
Dickinson	ND00148	RECLAMATION	Federal	Dickinson, Lehigh, Gladstone
English Coulee Dam	ND00425	Grand Forks County WRB	Local Government	Rural Emerado Twp.
Fordville Dam	ND00386	Grand Forks County WRB	Local Government	Forest River Colony
Garrison Dam	ND00145	USACE - Omaha District	Federal	Pick City, Stanton, Fort Clark, Hensler, Washburn, Sanger, Price, Bismarck, Mandan, Huff, Fort Rice, Cannon Ball, Fort Yates
Garrison Dam - Williston Levee	ND00145	USACE - Omaha District	Federal	Williston, Avoca
Gordon	ND01068	BIA	Federal	North Rolette Twp/Turtle Mountain Reservation
Heart Butte	ND00149	RECLAMATION	Federal	Lyons, Mandan
Homme Dam	ND00310	USACE - St. Paul District	Federal	Park River
Hunter Dam	ND00028	City of Hunter	Local Government	Hunter
Jackman Coulee Dam 2	ND00933	City of Bismarck	Local Government	Bismarck
Jamestown	ND00151	RECLAMATION	Federal	Jamestown
Lake Darling Dam	ND00332	US FISH AND WILDLIFE SERVICE	Federal	Burlington
Lake Ilo Dam	ND00321	US FISH AND WILDLIFE SERVICE	Federal	Dunn Center

Dam Name	NID ID	Owner Names	Owner Types	Downstream Communities at Risk
Little Shell (Belcourt)	ND00535	BIA	Federal	Belcourt
Maple River Dam	ND01031	Cass County Joint WRB	Local Government	Enderlin Twp.
Maple River Dam (T-180)	ND00472	Maple River WRB	Local Government	Enderlin Twp.
Matejcek Dam	ND00043	Walsh County WRB	Local Government	Cleveland Twp.
McGregor Dam	ND00003	ND Game & Fish	State	McGregor
Minot Lagoon - Cell 1	ND01184	City of Minot	Local Government	Minot, Surrey
Minot Lagoon - Cell 2	ND01185	City of Minot	Local Government	Minot, Surrey
Minot Lagoon - Cell 3	ND01186	City of Minot	Local Government	Minot, Surrey
Minot Lagoon - Cell 4	ND01187	City of Minot	Local Government	Minot, Surrey
Miont Lagoon - Cell 5	ND01188	City of Minot	Local Government	Minot, Surrey
Mott Watershed Dam	ND00080	Hettinger County WRB	Local Government	Mott
Nelson Lake Dam	ND00096	Minnkota Power Coop	Public Utility	Center Twp.
Olson Dam	ND00056	Pembina County WRB	Local Government	Beaulieu
Pipestem Dam	ND00146	USACE - Omaha District	Federal	Jamestown
Prairie No. 1	ND01097	BIA	Federal	Standing Rock Sioux Reservation
Queen City Dam	ND00023	City of Dickinson	Local Government	Dickinson
Renwick Dam	ND00054	Pembina County WRB	Local Government	Akra, Cavalier
Senator Young Dam	ND00055	Pembina County WRB	Local Government	South Olga Twp.
Spirit Lake Bia 4 North	ND01087	BIA	Federal	Fort Totten, Mission, Wood Lake
Spirit Lake Bia 4 South	ND01088	BIA	Federal	Fort Totten, Mission, Wood Lake
Spirit Lake Bia 5	ND01089	BIA	Federal	Fort Totten, Mission, Wood Lake
Spirit Lake Jetty 1	ND01090	BIA	Federal	Fort Totten, Mission, Wood Lake
Spirit Lake Jetty 2	ND01091	BIA	Federal	Fort Totten, Mission, Wood Lake
Spirit Lake Kurtz Dam	ND01092	BIA	Federal	Fort Totten, Mission, Wood Lake

Dam Name	NID ID	Owner Names	Owner Types	Downstream Communities at Risk
Spirit Lake Spring Lake	ND01093	BIA	Federal	Fort Totten, Mission, Wood Lake
Spirit Lake St. Michael 1	ND01094	BIA	Federal	Fort Totten, Mission, Wood Lake
Spirit Lake St. Michael 2	ND01095	BIA	Federal	Fort Totten, Mission, Wood Lake
Square Butte Creek Dam 5	ND00393	Oliver County WRB	Local Government	East Oliver Twp
Sweetbriar Creek Dam	ND00038	ND Game & Fish	State	New Salem Twp.
Tioga Dam	ND00026	City of Tioga	Local Government	Tioga
Upper Turtle River Flood Ret. 4	ND00746	Grand Forks County WRB	Local Government	Niagara Twp.
Upper Turtle River Flood Ret. 5	ND00388	Grand Forks County WRB	Local Government	Niagara Twp.
Upper Turtle River Flood Ret. 9	ND00391	Grand Forks County WRB	Local Government	Niagara Twp.
White Earth Dam	ND00034	Mountrail County WRB	Local Government	White Earth, Sorkness Twp

Source: National Inventory of Dams, 2022

E.8.4 Hazard Ranking by County

Plan	Ranking
Adams County	Low
Barnes County	Low
Benson County	Low
Billings County[1]	Low
Bottineau County	Low
Bowman County[3]	Low
Burke County[4]	Moderate

Plan	Ranking
Burleigh County	High
Cass County	Moderate
Cavalier County	Not Mentioned
Dickey County	High
Divide County[4]	Moderate
Dunn County[1]	Low
Eddy County[2]	Low
Emmons County	Low
Foster County	Low
Golden Valley County[1]	Low
Grand Forks County	Not Mentioned
Grant County	Low
Griggs County	Moderate
Hettinger County	Low
Kidder County	Not Mentioned
LaMoure County	Low
Logan County	Low
McHenry County	Low
McIntosh County	Low
McKenzie County	Low
McLean County	Not Mentioned
Mercer County	Low
Morton County	Low
Mountrail County	Low
Nelson County	Moderate
Oliver County	Low
Pembina County	Not Mentioned
Pierce County	Low
Ramsey County	Low
Ransom County	Low
Renville County	Moderate
Richland County	Low
Rolette County	High
Sargent County	Not Mentioned
Sheridan County	Not Mentioned
Sioux County[5]	Low
Slope County[3]	Low
Spirit Lake Nation	Low
Stark County[1]	Low
Standing Rock Sioux Tribe[5]	Low
Steele County	Low
Stutsman County	Low

Plan	Ranking
Three Affiliated Tribes	Not Mentioned
Towner County	Low
Traill County	Low
Turtle Mountain	Moderate
Walsh County	Moderate
Ward County	Not Mentioned
Wells County[2]	Low
Williams County	Low
City of Bismarck	Low

Source: Cumulation of data extracted from local and tribal plans

E.9 Hazardous Material Release

E.9.1 Historic Occurrences

- **August 28, 1985:** A truck hauling uranium oxide and a freight train collided, killing the driver and exposing 30 to 40 first responders and BNSF train crewmembers to radioactive material. No one was hospitalized but the area had to be sealed off while it was cleaned (Associated Press, 1985).
- **April 5, 1987:** A Minot farm chemical warehouse caught fire, creating explosions and forcing 15,000 people to evacuate and hospitalizing 42, from a fire initiated from an overheating pickup truck. Among those evacuated was a senior citizen apartment building and three homes for the disabled (UPI Archives, 1987).
- **September 3, 2008:** A Fargo duplex was leveled by an explosion, injuring 13 people from a single immigrant family, two members of which had to be airlifted to Minneapolis (Associated Press, 2008). The natural gas leak that caused the incident was found to be caused by a leaking pipe from a known-deficient product that had caused other explosions around the country (Wetzel, 2009).
- **July 23, 2010:** A farm truck lost canisters of insecticide and emulsifier on I-94 near Medina. While no one was injured, the interstate was closed for seven hours as the inhalation hazard was cleared from the roadway (Jamestown Sun Staff, 2010).
- **December 30, 2013:** An oil train collided with a derailed car from a regular freight train triggering explosions and fires near Casselton (Neuman, 2013).
- **May 6, 2015:** An oil train derailment in Heimdal led to evacuation of the community as six derailed cars burned (ABC News, 2015).
- **July 28, 2017:** A McKenzie County Rural Water worker accidentally bored into a liquid natural gas pipeline southeast of Watford City. No one was injured (Minot Daily News, 2017).
- **February 18, 2018:** A diesel fuel tank fire prompted a shelter-in-place order in West Fargo. West Fargo FD called on BNSF, Hector Airport, and the National Guard to assure there was enough foam to put out the fire (KVRR, 2018)

E.9.2 Hazardous Substances and Reportable Quantities

Listed hazardous substances. The elements and compounds and hazardous wastes appearing in table 302.4 are designated as hazardous substances under section 102(a) of the Act.

Unlisted hazardous substances. A solid waste, as defined in 40 CFR 261.2, which is not excluded from regulation as a hazardous waste under 40 CFR 261.4(b), is a hazardous substance under section 101(14) of the Act if it exhibits any of the characteristics identified in 40 CFR 261.20 through 261.24.

Note I to Table 302.4

The numbers under the column headed "CASRN" are the Chemical Abstracts Service Registry Numbers for each hazardous substance. CASRNs are unique numeric identifiers for specific substances. CASRNs are updated by the Chemical Abstract Service and are sometimes deleted or replaced. This list of Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) hazardous substances relies on information provided in the statutory lists that comprise the table. CASRNs are provided for convenience only to aid in the identification of the designated hazardous substance. Some CASRNs are given only for parent compounds. In some cases, a chemical name may have more than one CASRN associated with it due to the chemical's various forms; however, each CAS Registry Number is a unique numeric identifier and designates only one substance. That is, two substances, or two forms of a substance, do not have the same CAS Registry Number. If there is a discrepancy between the hazardous substance name and the listed CAS Registry Number, the hazardous substance names appearing in Table 302.4 should be used as the official means to determine if a given chemical or substance is reportable.

Note II to Table 302.4

Hazardous substances are given a Statutory Code based on their statutory source. The "Statutory Code" column indicates the statutory source for designating each substance as a CERCLA hazardous substance. Statutory Code "1" indicates a Clean Water Act (CWA) Hazardous Substance [40 CFR 116.4; 33 U.S.C. 1321(b)(2)(A)]. Statutory Code "2" indicates a CWA Toxic Pollutant [40 CFR 401.15, 40 CFR part 423 Appendix A, and/or 40 CFR 131.36; 33 U.S.C. 1317(a)]. Statutory Code "3" indicates a Clean Air Act (CAA) Hazardous Air Pollutant (HAP) [42 U.S.C. 7412(b); Pub. L. 101-549 November 15, 1990; 70 FR 75047 December 19, 2005; 69 FR 69320 November 29, 2004; 61 FR 30816 June 18, 1996; 65 FR 47342 August 2, 2000; 87 FR 393 January 5, 2022]. Statutory Code "4" indicates Resource Conservation and Recovery Act (RCRA) Hazardous Wastes [40 CFR part 261 Subpart D - Lists of Hazardous Wastes; 42 U.S.C. 6921]. The "RCRA waste No." column provides the waste identification numbers assigned by RCRA regulations. The "Final RQ [pounds (kg)]" column provides the reportable quantity for each hazardous substance in pounds and kilograms.

Table 302.4 - List of Hazardous Substances and Reportable Quantities

Hazardous substance	CASRN I	Statutory code II	RCRA waste No.	Final RQ [pounds (kg)]
A2213	30558-43-1	4	U394	5000 (2270)
Acenaphthene	83-32-9	2		100 (45.4)

Hazardous substance	CASRN I	Statutory code II	RCRA waste No.	Final RQ [pounds (kg)]
Acenaphthylene	208-96-8	2		5000 (2270)
Acetaldehyde	75-07-0	1,3,4	U001	1000 (454)
Acetaldehyde, chloro-	107-20-0	4	P023	1000 (454)
Acetaldehyde, trichloro-	75-87-6	4	U034	5000 (2270)
Acetamide	60-35-5	3		100 (45.4)
Acetamide, N-(aminothioxomethyl)-	591-08-2	4	P002	1000 (454)
Acetamide, N-(4-ethoxyphenyl)-	62-44-2	4	U187	100 (45.4)
Acetamide, N-9H-fluoren-2-yl-	53-96-3	3,4	U005	1 (0.454)
Acetamide, 2-fluoro-	640-19-7	4	P057	100 (45.4)
Acetic acid	64-19-7	1		5000 (2270)
Acetic acid, (2,4-dichlorophenoxy)-, salts & esters	94-75-7	1,3,4	U240	100 (45.4)
Acetic acid, ethyl ester	141-78-6	4	U112	5000 (2270)
Acetic acid, fluoro-, sodium salt	62-74-8	4	P058	10 (4.54)
Acetic acid, lead(2 +) salt	301-04-2	1,4	U144	10 (4.54)
Acetic acid, thallium(1 +) salt	563-68-8	4	U214	100 (45.4)
Acetic acid, (2,4,5-trichlorophenoxy)-	93-76-5	1,4	See F027	1000 (454)
Acetic anhydride	108-24-7	1		5000 (2270)
Acetone	67-64-1	4	U002	5000 (2270)
Acetone cyanohydrin	75-86-5	1,4	P069	10 (4.54)
Acetonitrile	75-05-8	3,4	U003	5000 (2270)
Acetophenone	98-86-2	3,4	U004	5000 (2270)
2-Acetylaminofluorene	53-96-3	3,4	U005	1 (0.454)
Acetyl bromide	506-96-7	1		5000 (2270)
Acetyl chloride	75-36-5	1,4	U006	5000 (2270)
1-Acetyl-2-thiourea	591-08-2	4	P002	1000 (454)
Acrolein	107-02-8	1,2,3,4	P003	1 (0.454)
Acrylamide	79-06-1	3,4	U007	5000 (2270)
Acrylic acid	79-10-7	3,4	U008	5000 (2270)
Acrylonitrile	107-13-1	1,2,3,4	U009	100 (45.4)
Adipic acid	124-04-9	1		5000 (2270)
Aldicarb	116-06-3	4	P070	1 (0.454)
Aldicarb sulfone	1646-88-4	4	P203	100 (45.4)
Aldrin	309-00-2	1,2,4	P004	1 (0.454)
Allyl alcohol	107-18-6	1,4	P005	100 (45.4)
Allyl chloride	107-05-1	1,3		1000 (454)

Hazardous substance	CASRN I	Statutory code II	RCRA waste No.	Final RQ [pounds (kg)]
Aluminum phosphide	20859-73-8	4	P006	100 (45.4)
Aluminum sulfate	10043-01-3	1		5000 (2270)
4-Aminobiphenyl	92-67-1	3		1 (0.454)
5-(Aminomethyl)-3-isoxazolol	2763-96-4	4	P007	1000 (454)
4-Aminopyridine	504-24-5	4	P008	1000 (454)
Amitrole	61-82-5	4	U011	10 (4.54)
Ammonia	7664-41-7	1		100 (45.4)
Ammonium acetate	631-61-8	1		5000 (2270)
Carbofuran	1563-66-2	1,4	P127	10 (4.54)
Carbofuran phenol	1563-38-8	4	U367	10 (4.54)
Carbon disulfide	75-15-0	1,3,4	P022	100 (45.4)
Carbonic acid, dithallium(1 +) salt	6533-73-9	4	U215	100 (45.4)
Carbonic dichloride	75-44-5	1,3,4	P095	10 (4.54)
Carbonic difluoride	353-50-4	4	U033	1000 (454)
Carbonochloridic acid, methyl ester	79-22-1	4	U156	1000 (454)
Carbon oxyfluoride	353-50-4	4	U033	1000 (454)
Carbon tetrachloride	56-23-5	1,2,3,4	U211	10 (4.54)
Carbonyl sulfide	463-58-1	3		100 (45.4)
Carbosulfan	55285-14-8	4	P189	1000 (454)
Catechol	120-80-9	3		100 (45.4)
Chloral	75-87-6	4	U034	5000 (2270)
Chloramben	133-90-4	3		100 (45.4)
Chlorambucil	305-03-3	4	U035	10 (4.54)
CHLORDANE (TECHNICAL MIXTURE AND METABOLITES)	57-74-9	1,2,3,4	U036	1 (0.454)
Chlordane	57-74-9	1,2,3,4	U036	1 (0.454)
Chlordane, alpha & gamma isomers	57-74-9 5103-71-9 5103-74-2	1,2,3,4	U036	1 (0.454)
CHLORINATED BENZENES	N.A.	2		**
Chlorinated camphene	8001-35-2	1,2,3,4	P123	1 (0.454)
CHLORINATED ETHANES	N.A.	2		**
CHLORINATED NAPHTHALENE	N.A.	2		**
CHLORINATED PHENOLS	N.A.	2		**
Chlorine	7782-50-5	1,3		10 (4.54)
Chlornaphazine	494-03-1	4	U026	100 (45.4)
Chloroacetaldehyde	107-20-0	4	P023	1000 (454)
Chloroacetic acid	79-11-8	3		100 (45.4)
2-Chloroacetophenone	532-27-4	3		100 (45.4)
CHLOROALKYL ETHERS	N.A.	2		**
p-Chloroaniline	106-47-8	4	P024	1000 (454)

Hazardous substance	CASRN I	Statutory code II	RCRA waste No.	Final RQ [pounds (kg)]
Chlorobenzene	108-90-7	1,2,3,4	U037	100 (45.4)
Chlorobenzilate	510-15-6	3,4	U038	10 (4.54)
p-Chloro-m-cresol	59-50-7	2,4	U039	5000 (2270)
Chlorodibromomethane	124-48-1	2		100 (45.4)
1-Chloro-2,3-epoxypropane	106-89-8	1,3,4	U041	100 (45.4)
Chloroethane	75-00-3	2,3		100 (45.4)
2-Chloroethyl vinyl ether	110-75-8	2,4	U042	1000 (454)
Chloroform	67-66-3	1,2,3,4	U044	10 (4.54)
Chloromethane	74-87-3	2,3,4	U045	100 (45.4)
Chloromethyl methyl ether	107-30-2	3,4	U046	10 (4.54)
beta-Chloronaphthalene	91-58-7	2,4	U047	5000 (2270)
2-Chloronaphthalene	91-58-7	2,4	U047	5000 (2270)
2-Chlorophenol	95-57-8	2,4	U048	100 (45.4)
o-Chlorophenol	95-57-8	2,4	U048	100 (45.4)
4-Chlorophenyl phenyl ether	7005-72-3	2		5000 (2270)
1-(o-Chlorophenyl)thiourea	5344-82-1	4	P026	100 (45.4)
Chloroprene	126-99-8	3		100 (45.4)
3-Chloropropionitrile	542-76-7	4	P027	1000 (454)
Chlorosulfonic acid	7790-94-5	1		1000 (454)
4-Chloro-o-toluidine, hydrochloride	3165-93-3	4	U049	100 (45.4)
Chlorpyrifos	2921-88-2	1		1 (0.454)
Chromic acetate	1066-30-4	1		1000 (454)
Chromic acid	7738-94-5	1		10 (4.54)
Chromic acid H2CrO4, calcium salt	13765-19-0	1,4	U032	10 (4.54)
Chromic sulfate	10101-53-8	1		1000 (454)
CHROMIUM AND COMPOUNDS	N.A.	2,3		**
Chromium Compounds	N.A.	2,3		**
Chromium III	7440-47-3	2		5000 (2270)
Chromous chloride	10049-05-5	1		1000 (454)
Chrysene	218-01-9	2,4	U050	100 (45.4)
Cobalt Compounds	N.A.	3		**
Cobaltous bromide	7789-43-7	1		1000 (454)
Cobaltous formate	544-18-3	1		1000 (454)
Cobaltous sulfamate	14017-41-5	1		1000 (454)
Coke Oven Emissions	N.A.	3		1 (0.454)
COPPER AND COMPOUNDS	N.A.	2		**
Copper III	7440-50-8	2		5000 (2270)
Copper cyanide Cu(CN)	544-92-3	4	P029	10 (4.54)

Hazardous substance	CASRN I	Statutory code II	RCRA waste No.	Final RQ [pounds (kg)]
Coumaphos	56-72-4	1		10 (4.54)
Creosote	N.A	4	U051	1 (0.454)
Cresol (cresylic acid)	1319-77-3	1,3,4	U052	100 (45.4)
m-Cresol	108-39-4	3		100 (45.4)
o-Cresol	95-48-7	3		100 (45.4)
p-Cresol	106-44-5	3		100 (45.4)
Cresols (isomers and mixture)	1319-77-3	1,3,4	U052	100 (45.4)
Cresylic acid (isomers and mixture)	1319-77-3	1,3,4	U052	100 (45.4)
Crotonaldehyde	123-73-9	1,4	U053	100 (45.4)
	4170-30-3			
Cumene	98-82-8	3,4	U055	5000 (2270)
m-Cumenyl methylcarbamate	64-00-6	4	P202	10 (4.54)
Cupric acetate	142-71-2	1		100 (45.4)
Cupric acetoarsenite	12002-03-8	1		1 (0.454)
Cupric chloride	7447-39-4	1		10 (4.54)
Cupric nitrate	3251-23-8	1		100 (45.4)
Cupric oxalate	55671-32-4	1		100 (45.4)
Cupric sulfate	7758-98-7	1		10 (4.54)
Cupric sulfate, ammoniated	10380-29-7	1		100 (45.4)
Cupric tartrate	815-82-7	1		100 (45.4)
CYANIDES	N.A.	2,3		**
Cyanide Compounds	N.A.	2,3		**
Cyanides (soluble salts and complexes) not otherwise specified	N.A.	4	P030	10 (4.54)
Cyanogen	460-19-5	4	P031	100 (45.4)
Cyanogen bromide (CN)Br	506-68-3	4	U246	1000 (454)
Cyanogen chloride (CN)Cl	506-77-4	1,4	P033	10 (4.54)
2,5-Cyclohexadiene-1,4-dione	106-51-4	3,4	U197	10 (4.54)
Cyclohexane	110-82-7	1,4	U056	1000 (454)
Cyclohexane, 1,2,3,4,5,6-hexachloro-, (1α, 2α, 3β-, 4α, 5α, 6β)	58-89-9	1,2,3,4	U129	1 (0.454)
Cyclohexanone	108-94-1	4	U057	5000 (2270)
2-Cyclohexyl-4,6-dinitrophenol	131-89-5	4	P034	100 (45.4)
1,3-Cyclopentadiene, 1,2,3,4,5,5-hexachloro-	77-47-4	1,2,3,4	U130	10 (4.54)
Cyclophosphamide	50-18-0	4	U058	10 (4.54)
2,4-D Acid	94-75-7	1,3,4	U240	100 (45.4)
2,4-D Ester	94-11-1	1		100 (45.4)
	94-79-1			
	94-80-4			
	1320-18-9			
	1928-38-7			
	1928-61-6			

Hazardous substance	CASRN I	Statutory code II	RCRA waste No.	Final RQ [pounds (kg)]
	1929-73-3			
	2971-38-2			
	25168-26-7			
	53467-11-1			
2,4-D, salts and esters	94-75-7	1,3,4	U240	100 (45.4)
Daunomycin	20830-81-3	4	U059	10 (4.54)
DDD	72-54-8	1,2,4	U060	1 (0.454)
4,4'-DDD	72-54-8	1,2,4	U060	1 (0.454)
DDE b	72-55-9	2,4		1 (0.454)
DDE b	4/4/3547	3		5000 (2270)
4,4'-DDE	72-55-9	2,4		1 (0.454)
DDT	50-29-3	1,2,4	U061	1 (0.454)
4,4'-DDT	50-29-3	1,2,4	U061	1 (0.454)
DDT AND METABOLITES	N.A.	2		**
DEHP	117-81-7	2,3,4	U028	100 (45.4)
Diallate	2303-16-4	4	U062	100 (45.4)
Diazinon	333-41-5	1		1 (0.454)
Diazomethane	334-88-3	3		100 (45.4)
Dibenz[a,h]anthracene	53-70-3	2,4	U063	1 (0.454)
1,2:5,6-Dibenzanthracene	53-70-3	2,4	U063	1 (0.454)
Dibenzo[a,h]anthracene	53-70-3	2,4	U063	1 (0.454)
Dibenzofuran	132-64-9	3		100 (45.4)
Dibenzo[a,i]pyrene	189-55-9	4	U064	10 (4.54)
1,2-Dibromo-3-chloropropane	96-12-8	3,4	U066	1 (0.454)
Dibromoethane	106-93-4	1,3,4	U067	1 (0.454)
Dibutyl phthalate	84-74-2	1,2,3,4	U069	10 (4.54)
Di-n-butyl phthalate	84-74-2	1,2,3,4	U069	10 (4.54)
Dicamba	1918-00-9	1		1000 (454)
Dichlobenil	1194-65-6	1		100 (45.4)
Dichlone	117-80-6	1		1 (0.454)
Dichlorobenzene	25321-22-6	1,2		100 (45.4)
1,2-Dichlorobenzene	95-50-1	1,2,4	U070	100 (45.4)
1,3-Dichlorobenzene	541-73-1	2,4	U071	100 (45.4)
1,4-Dichlorobenzene	106-46-7	1,2,3,4	U072	100 (45.4)
m-Dichlorobenzene	541-73-1	2,4	U071	100 (45.4)
o-Dichlorobenzene	95-50-1	1,2,4	U070	100 (45.4)
p-Dichlorobenzene	106-46-7	1,2,3,4	U072	100 (45.4)
DICHLOROBENZIDINE	1331-47-1	2		**
3,3'-Dichlorobenzidine	91-94-1	2,3,4	U073	1 (0.454)
Dichlorobromomethane	75-27-4	2		5000 (2270)

Hazardous substance	CASRN I	Statutory code II	RCRA waste No.	Final RQ [pounds (kg)]
1,4-Dichloro-2-butene	764-41-0	4	U074	1 (0.454)
Dichlorodifluoromethane	75-71-8	4	U075	5000 (2270)
1,1-Dichloroethane	75-34-3	2,3,4	U076	1000 (454)
1,2-Dichloroethane	107-06-2	1,2,3,4	U077	100 (45.4)
1,1-Dichloroethylene	75-35-4	1,2,3,4	U078	100 (45.4)
1,2-Dichloroethylene	156-60-5	2,4	U079	1000 (454)
Dichloroethyl ether	111-44-4	2,3,4	U025	10 (4.54)
Dichloroisopropyl ether	108-60-1	2,4	U027	1000 (454)
Dichloromethane	75-09-2	2,3,4	U080	1000 (454)
Dichloromethoxy ethane	111-91-1	2,4	U024	1000 (454)
Dichloromethyl ether	542-88-1	3,4	P016	10 (4.54)
2,4-Dichlorophenol	120-83-2	2,4	U081	100 (45.4)
2,6-Dichlorophenol	87-65-0	4	U082	100 (45.4)
Dichlorophenylarsine	696-28-6	4	P036	1 (0.454)
Dichloropropane	26638-19-7	1,2		1000 (454)
1,1-Dichloropropane	78-99-9	1,2		1000 (454)
1,2-Dichloropropane	78-87-5	1,2,3,4	U083	1000 (454)
1,3-Dichloropropane	142-28-9	1,2		1000 (454)
Dichloropropane - Dichloropropene (mixture)	8003-19-8	1		100 (45.4)
Dichloropropene	26952-23-8	1,2		100 (45.4)
1,3-Dichloropropene	542-75-6	1,2,3,4	U084	100 (45.4)
2,3-Dichloropropene	78-88-6	1,2		100 (45.4)
2,2-Dichloropropionic acid	75-99-0	1		5000 (2270)
Dichlorvos	62-73-7	1,3		10 (4.54)
Dicofol	115-32-2	1		10 (4.54)
Dieldrin	60-57-1	1,2,4	P037	1 (0.454)
1,2:3,4-Diepoxybutane	1464-53-5	4	U085	10 (4.54)
Diethanolamine	111-42-2	3		100 (45.4)
Diethylamine	109-89-7	1		100 (45.4)
N,N-Diethylaniline	91-66-7	3		1000 (454)
Diethylarsine	692-42-2	4	P038	1 (0.454)
1,4-Diethyleneoxide	123-91-1	3,4	U108	100 (45.4)
Diethylene glycol, dicarbamate	5952-26-1	4	U395	5000 (2270)
Diethylhexyl phthalate	117-81-7	2,3,4	U028	100 (45.4)
N,N'-Diethylhydrazine	1615-80-1	4	U086	10 (4.54)
O,O-Diethyl S-methyl dithiophosphate	3288-58-2	4	U087	5000 (2270)
Diethyl-p-nitrophenyl phosphate	311-45-5	4	P041	100 (45.4)
Diethyl phthalate	84-66-2	2,4	U088	1000 (454)
O,O-Diethyl O-pyrazinyl phosphorothioate	297-97-2	4	P040	100 (45.4)

Hazardous substance	CASRN I	Statutory code II	RCRA waste No.	Final RQ [pounds (kg)]
Diethylstilbestrol	56-53-1	4	U089	1 (0.454)
Diethyl sulfate	64-67-5	3		10 (4.54)
Dihydrosafrole	94-58-6	4	U090	10 (4.54)
Diisopropylfluorophosphate (DFP)	55-91-4	4	P043	100 (45.4)
1,4:5,8-Dimethanonaphthalene, 1,2,3,4,10,10-hexachloro-1,4,4a,5,8,8a-hexahydro-, (1alpha,4alpha,4abeta,5alpha, 8alpha,8abeta)-	309-00-2	1,2,4	P004	1 (0.454)
1,4:5,8-Dimethanonaphthalene, 1,2,3,4,10,10-hexachloro-1,4,4a,5,8,8a-hexahydro-, (1alpha,4alpha,4abeta, 5beta,8beta,8abeta)-	465-73-6	4	P060	1 (0.454)
2,7:3,6-Dimethanonaphth[2,3- b]oxirene,3,4,5,6,9,9-hexachloro-1a,2,2a,3,6,6a,7,7a- octahydro-,(1aalpha,2beta, 2aalpha,3beta,6beta,6aalpha, 7beta,7aalpha)-	60-57-1	1,2,4	P037	1 (0.454)
2,7:3,6-Dimethanonaphth[2, 3-b]oxirene,3,4,5,6,9,9-hexachloro-1a,2,2a,3,6,6a,7,7a- octahydro-,(1aalpha,2beta, 2abeta,3alpha,6alpha, 6abeta,7beta,7aalpha)-, & metabolites	72-20-8	1,2,4	P051	1 (0.454)
Dimethoate	60-51-5	4	P044	10 (4.54)
3,3'-Dimethoxybenzidine	119-90-4	3,4	U091	100 (45.4)
Dimethylamine	124-40-3	1,4	U092	1000 (454)
Dimethyl aminoazobenzene	60-11-7	3,4	U093	10 (4.54)
p-Dimethylaminoazobenzene	60-11-7	3,4	U093	10 (4.54)
N,N-Dimethylaniline	121-69-7	3		100 (45.4)
7,12-Dimethylbenz[a]anthracene	57-97-6	4	U094	1 (0.454)
3,3'-Dimethylbenzidine	119-93-7	3,4	U095	10 (4.54)
alpha,alpha-Dimethylbenzylhydroperoxide	80-15-9	4	U096	10 (4.54)
Dimethylcarbamoyl chloride	79-44-7	3,4	U097	1 (0.454)
Dimethylformamide	68-12-2	3		100 (45.4)
1,1-Dimethylhydrazine	57-14-7	3,4	U098	10 (4.54)
1,2-Dimethylhydrazine	540-73-8	4	U099	1 (0.454)
alpha,alpha-Dimethylphenethylamine	122-09-8	4	P046	5000 (2270)
2,4-Dimethylphenol	105-67-9	2,4	U101	100 (45.4)
Dimethyl phthalate	131-11-3	2,3,4	U102	5000 (2270)
Dimethyl sulfate	77-78-1	3,4	U103	100 (45.4)
Dimetilan	644-64-4	4	P191	1 (0.454)
Dinitrobenzene (mixed)	25154-54-5	1		100 (45.4)
m-Dinitrobenzene	99-65-0	1		100 (45.4)
o-Dinitrobenzene	528-29-0	1		100 (45.4)
p-Dinitrobenzene	100-25-4	1		100 (45.4)
4,6-Dinitro-o-cresol	534-52-1	2,3,4	P047	10 (4.54)
4,6-Dinitro-o-cresol, and salts	534-52-1	3,4	P047	10 (4.54)
Dinitrophenol	25550-58-7	1		10 (4.54)
2,4-Dinitrophenol	51-28-5	1,2,3,4	P048	10 (4.54)
2,5-Dinitrophenol	329-71-5	1		10 (4.54)

Hazardous substance	CASRN I	Statutory code II	RCRA waste No.	Final RQ [pounds (kg)]
2,6-Dinitrophenol	573-56-8	1		10 (4.54)
Dinitrotoluene	25321-14-6	1,2		10 (4.54)
2,4-Dinitrotoluene	121-14-2	1,2,3,4	U105	10 (4.54)
2,6-Dinitrotoluene	606-20-2	1,2,4	U106	100 (45.4)
3,4-Dinitrotoluene	610-39-9	1,2		10 (4.54)
Dinoseb	88-85-7	4	P020	1000 (454)
Di-n-octyl phthalate	117-84-0	2,4	U107	5000 (2270)
1,4-Dioxane	123-91-1	3,4	U108	100 (45.4)
DIPHENYLHYDRAZINE	38622-18-3	2		**
1,2-Diphenylhydrazine	122-66-7	2,3,4	U109	10 (4.54)
Diphosphoramide, octamethyl-	152-16-9	4	P085	100 (45.4)
Diphosphoric acid, tetraethyl ester	107-49-3	1,4	P111	10 (4.54)
Dipropylamine	142-84-7	4	U110	5000 (2270)
Di-n-propylnitrosamine	621-64-7	2,4	U111	10 (4.54)
Diquat	85-00-7 2764-72-9	1		1000 (454)
Disulfoton	298-04-4	1,4	P039	1 (0.454)
Dithiobiuret	541-53-7	4	P049	100 (45.4)
1,3-Dithiolane-2-carboxaldehyde, 2,4-dimethyl-, O-[(methylamino)-carbonyl]oxime	26419-73-8	4	P185	100 (45.4)
Diuron	330-54-1	1		100 (45.4)
Dodecylbenzenesulfonic acid	27176-87-0	1		1000 (454)
ENDOSULFAN AND METABOLITES	N.A.	2		**
Endosulfan	115-29-7	1,2,4	P050	1 (0.454)
alpha-Endosulfan	959-98-8	2		1 (0.454)
beta-Endosulfan	33213-65-9	2		1 (0.454)
Endosulfan sulfate	1031-07-8	2		1 (0.454)
Endothall	145-73-3	4	P088	1000 (454)
ENDRIN AND METABOLITES	N.A.	2,4	P051	**
Endrin, & metabolites	72-20-8	1,2,4	P051	1 (0.454)
Endrin	72-20-8	1,2,4	P051	1 (0.454)
Endrin aldehyde	7421-93-4	2		1 (0.454)
Epichlorohydrin	106-89-8	1,3,4	U041	100 (45.4)
Epinephrine	51-43-4	4	P042	1000 (454)
1,2-Epoxybutane	106-88-7	3		100 (45.4)
Ethanal	75-07-0	1,3,4	U001	1000 (454)
Ethanamine, N,N-diethyl-	121-44-8	1,3,4	U404	5000 (2270)
Ethanamine, N-ethyl-N-nitroso-	55-18-5	4	U174	1 (0.454)
1,2-Ethanediamine, N,N-dimethyl-N'-2- pyridinyl-N'-(2-thienylmethyl)-	91-80-5	4	U155	5000 (2270)

Hazardous substance	CASRN I	Statutory code II	RCRA waste No.	Final RQ [pounds (kg)]
Ethane, 1,2-dibromo-	106-93-4	1,3,4	U067	1 (0.454)
Ethane, 1,1-dichloro-	75-34-3	2,3,4	U076	1000 (454)
Ethane, 1,2-dichloro-	107-06-2	1,2,3,4	U077	100 (45.4)
Ethanedinitrile	460-19-5	4	P031	100 (45.4)
Ethane, hexachloro-	67-72-1	2,3,4	U131	100 (45.4)
Ethane, 1,1'-[methylenebis(oxy)]bis[2- chloro-	111-91-1	2,4	U024	1000 (454)
Ethane, 1,1'-oxybis-	60-29-7	4	U117	100 (45.4)
Ethane, 1,1'-oxybis[2-chloro-	111-44-4	2,3,4	U025	10 (4.54)
Ethane, pentachloro-	76-01-7	4	U184	10 (4.54)
Ethane, 1,1,1,2-tetrachloro-	630-20-6	4	U208	100 (45.4)
Ethane, 1,1,2,2-tetrachloro-	79-34-5	2,3,4	U209	100 (45.4)
Ethanethioamide	62-55-5	4	U218	10 (4.54)
Ethane, 1,1,1-trichloro-	71-55-6	2,3,4	U226	1000 (454)
Ethane, 1,1,2-trichloro-	79-00-5	2,3,4	U227	100 (45.4)
Ethanimidothioic acid, 2-(dimethylamino)-N-hydroxy-2-oxo-, methyl ester	30558-43-1	4	U394	5000 (2270)
Ethanimidothioic acid, 2-(dimethylamino)-N-[[(methylamino)carbonyl]oxy]-2-oxo-, methyl ester	23135-22-0	4	P194	100 (45.4)
Ethanimidothioic acid, N-[[(methylamino) carbonyl]oxy]-, methyl ester	16752-77-5	4	P066	100 (45.4)
Ethanimidothioic acid, N,N'- [thiobis[(methylimino) carbonyloxy]]bis-, dimethyl ester	59669-26-0	4	U410	100 (45.4)
Ethanol, 2-ethoxy-	110-80-5	4	U359	1000 (454)
Ethanol, 2,2'-(nitrosoimino)bis-	1116-54-7	4	U173	1 (0.454)
Ethanol, 2,2'-oxybis-, dicarbamate	5952-26-1	4	U395	5000 (2270)
Ethanone, 1-phenyl-	98-86-2	3,4	U004	5000 (2270)
Ethene, chloro-	75-01-4	2,3,4	U043	1 (0.454)
Ethene, (2-chloroethoxy)-	110-75-8	2,4	U042	1000 (454)
Ethene, 1,1-dichloro-	75-35-4	1,2,3,4	U078	100 (45.4)
Ethene, 1,2-dichloro-(E)	156-60-5	2,4	U079	1000 (454)
Ethene, tetrachloro-	127-18-4	2,3,4	U210	100 (45.4)
Ethene, trichloro-	79-01-6	1,2,3,4	U228	100 (45.4)
Ethion	563-12-2	1		10 (4.54)
Ethyl acetate	141-78-6	4	U112	5000 (2270)
Ethyl acrylate	140-88-5	3,4	U113	1000 (454)
Ethylbenzene	100-41-4	1,2,3		1000 (454)
Ethyl carbamate	51-79-6	3,4	U238	100 (45.4)
Ethyl chloride	75-00-3	2,3		100 (45.4)
Ethyl cyanide	107-12-0	4	P101	10 (4.54)
Ethylenebisdithiocarbamic acid, salts & esters	111-54-6	4	U114	5000 (2270)

Hazardous substance	CASRN I	Statutory code II	RCRA waste No.	Final RQ [pounds (kg)]
Ethylenediamine	107-15-3	1		5000 (2270)
Ethylenediamine-tetraacetic acid (EDTA)	60-00-4	1		5000 (2270)
Ethylene dibromide	106-93-4	1,3,4	U067	1 (0.454)
Ethylene dichloride	107-06-2	1,2,3,4	U077	100 (45.4)
Ethylene glycol	107-21-1	3		5000 (2270)
Ethylene glycol monoethyl ether	110-80-5	4	U359	1000 (454)
Ethylene oxide	75-21-8	3,4	U115	10 (4.54)
Ethylenethiourea	96-45-7	3,4	U116	10 (4.54)
Ethylenimine	151-56-4	3,4	P054	1 (0.454)
Ethyl ether	60-29-7	4	U117	100 (45.4)
Ethylidene dichloride	75-34-3	2,3,4	U076	1000 (454)
Ethyl methacrylate	97-63-2	4	U118	1000 (454)
Ethyl methanesulfonate	62-50-0	4	U119	1 (0.454)
Famphur	52-85-7	4	P097	1000 (454)
Ferric ammonium citrate	1185-57-5	1		1000 (454)
Ferric ammonium oxalate	2944-67-4 55488-87-4	1		1000 (454)
Ferric chloride	7705-08-0	1		1000 (454)
Ferric fluoride	7783-50-8	1		100 (45.4)
Ferric nitrate	10421-48-4	1		1000 (454)
Ferric sulfate	10028-22-5	1		1000 (454)
Ferrous ammonium sulfate	10045-89-3	1		1000 (454)
Ferrous chloride	7758-94-3	1		100 (45.4)
Ferrous sulfate	7720-78-7 7782-63-0	1		1000 (454)
Fine mineral fibers c	N.A.	3		**
Fluoranthene	206-44-0	2,4	U120	100 (45.4)
Fluorene	86-73-7	2		5000 (2270)
Fluorine	7782-41-4	4	P056	10 (4.54)
Fluoroacetamide	640-19-7	4	P057	100 (45.4)
Fluoroacetic acid, sodium salt	62-74-8	4	P058	10 (4.54)
Formaldehyde	50-00-0	1,3,4	U122	100 (45.4)
Formetanate hydrochloride	23422-53-9	4	P198	100 (45.4)
Formic acid	64-18-6	1,4	U123	5000 (2270)
Formparanate	17702-57-7	4	P197	100 (45.4)
Fulminic acid, mercury(2 +)salt	628-86-4	4	P065	10 (4.54)
Fumaric acid	110-17-8	1		5000 (2270)
Furan	110-00-9	4	U124	100 (45.4)

Hazardous substance	CASRN I	Statutory code II	RCRA waste No.	Final RQ [pounds (kg)]
2-Furancarboxaldehyde	98-01-1	1,4	U125	5000 (2270)
2,5-Furandione	108-31-6	1,3,4	U147	5000 (2270)
Furan, tetrahydro-	109-99-9	4	U213	1000 (454)
Furfural	98-01-1	1,4	U125	5000 (2270)
Furfuran	110-00-9	4	U124	100 (45.4)
Glucopyranose, 2-deoxy-2-(3-methyl-3-nitrosoureido)-,D-	18883-66-4	4	U206	1 (0.454)
D-Glucose, 2-deoxy-2-[[(methylnitrosoamino)-carbonyl]amino]-	18883-66-4	4	U206	1 (0.454)
Glycidylaldehyde	765-34-4	4	U126	10 (4.54)
Glycol ethers d	N.A.	3		**
Guanidine, N-methyl-N'-nitro-N-nitroso-	70-25-7	4	U163	10 (4.54)
Guthion	86-50-0	1		1 (0.454)
HALOETHERS	N.A.	2		**
HALOMETHANES	N.A.	2		**
HEPTACHLOR AND METABOLITES	N.A.	2		**
Heptachlor	76-44-8	1,2,3,4	P059	1 (0.454)
Heptachlor epoxide	1024-57-3	2		1 (0.454)
Hexachlorobenzene	118-74-1	2,3,4	U127	10 (4.54)
Hexachlorobutadiene	87-68-3	2,3,4	U128	1 (0.454)
HEXACHLOROCYCLOHEXANE (all isomers)	608-73-1	2		**
Hexachlorocyclopentadiene	77-47-4	1,2,3,4	U130	10 (4.54)
Hexachloroethane	67-72-1	2,3,4	U131	100 (45.4)
Hexachlorophene	70-30-4	4	U132	100 (45.4)
Hexachloropropene	1888-71-7	4	U243	1000 (454)
Hexaethyl tetraphosphate	757-58-4	4	P062	100 (45.4)
Hexamethylene-1,6-diisocyanate	822-06-0	3		100 (45.4)
Hexamethylphosphoramide	680-31-9	3		1 (0.454)
Hexane	110-54-3	3		5000 (2270)
Hexone	108-10-1	3,4	U161	5000 (2270)
Hydrazine	302-01-2	3,4	U133	1 (0.454)
Hydrazinecarbothioamide	79-19-6	4	P116	100 (45.4)
Hydrazine, 1,2-diethyl-	1615-80-1	4	U086	10 (4.54)
Hydrazine, 1,1-dimethyl-	57-14-7	3,4	U098	10 (4.54)
Hydrazine, 1,2-dimethyl-	540-73-8	4	U099	1 (0.454)
Hydrazine, 1,2-diphenyl-	122-66-7	2,3,4	U109	10 (4.54)
Hydrazine, methyl-	60-34-4	3,4	P068	10 (4.54)
Hydrochloric acid	7647-01-0	1,3		5000 (2270)
Hydrocyanic acid	74-90-8	1,4	P063	10 (4.54)
Hydrofluoric acid	7664-39-3	1,3,4	U134	100 (45.4)

Hazardous substance	CASRN I	Statutory code II	RCRA waste No.	Final RQ [pounds (kg)]
Hydrogen chloride	7647-01-0	1,3		5000 (2270)
Hydrogen cyanide	74-90-8	1,4	P063	10 (4.54)
Hydrogen fluoride	7664-39-3	1,3,4	U134	100 (45.4)
Hydrogen phosphide	7803-51-2	3,4	P096	100 (45.4)
Hydrogen sulfide H2S	6/4/7783	1,4	U135	100 (45.4)
Hydroperoxide, 1-methyl-1-phenylethyl-	80-15-9	4	U096	10 (4.54)
Hydroquinone	123-31-9	3		100 (45.4)
2-Imidazolidinethione	96-45-7	3,4	U116	10 (4.54)
Indeno(1,2,3-cd)pyrene	193-39-5	2,4	U137	100 (45.4)
Iodomethane	74-88-4	3,4	U138	100 (45.4)
1,3-Isobenzofurandione	85-44-9	3,4	U190	5000 (2270)
Isobutyl alcohol	78-83-1	4	U140	5000 (2270)
Isodrin	465-73-6	4	P060	1 (0.454)
Isolan	119-38-0	4	P192	100 (45.4)
Isophorone	78-59-1	2,3		5000 (2270)
Isoprene	78-79-5	1		100 (45.4)
Isopropanolamine dodecylbenzenesulfonate	42504-46-1	1		1000 (454)
3-Isopropylphenyl N-methylcarbamate	64-00-6	4	P202	10 (4.54)
Isosafrole	120-58-1	4	U141	100 (45.4)
3(2H)-Isoxazolone, 5-(aminomethyl)-	2763-96-4	4	P007	1000 (454)
Kepone	143-50-0	1,4	U142	1 (0.454)
Lasiocarpine	303-34-4	4	U143	10 (4.54)
LEAD AND COMPOUNDS	N.A.	2,3		**
Lead III	7439-92-1	2		10 (4.54)
Lead acetate	301-04-2	1,4	U144	10 (4.54)
Lead arsenate	7784-40-9	1		1 (0.454)
	7645-25-2			
	10102-48-4			
Lead, bis(acetato-O)tetrahydroxytri-	1335-32-6	4	U146	10 (4.54)
Lead chloride	7758-95-4	1		10 (4.54)
Lead compounds	N.A.	2,3		**
Lead fluoborate	13814-96-5	1		10 (4.54)
Lead fluoride	7783-46-2	1		10 (4.54)
Lead iodide	10101-63-0	1		10 (4.54)
Lead nitrate	10099-74-8	1		10 (4.54)
Lead phosphate	7446-27-7	4	U145	10 (4.54)
Lead stearate	1072-35-1	1		10 (4.54)
	7428-48-0			
	56189-09-4			

Hazardous substance	CASRN I	Statutory code II	RCRA waste No.	Final RQ [pounds (kg)]
Lead subacetate	1335-32-6	4	U146	10 (4.54)
Lead sulfate	7446-14-2	1		10 (4.54)
	15739-80-7			
Lead sulfide	1314-87-0	1		10 (4.54)
Lead thiocyanate	592-87-0	1		10 (4.54)
Lindane	58-89-9	1,2,3,4	U129	1 (0.454)
Lindane (all isomers)	58-89-9	1,2,3,4	U129	1 (0.454)
Lithium chromate	14307-35-8	1		10 (4.54)
Malathion	121-75-5	1		100 (45.4)
Maleic acid	110-16-7	1		5000 (2270)
Maleic anhydride	108-31-6	1,3,4	U147	5000 (2270)
Maleic hydrazide	123-33-1	4	U148	5000 (2270)
Malononitrile	109-77-3	4	U149	1000 (454)
Manganese, bis (dimethylcarbamodithioato-S,S')-	15339-36-3	4	P196	10 (4.54)
Manganese Compounds	N.A.	3		**
Manganese dimethyldithiocarbamate	15339-36-3	4	P196	10 (4.54)
MDI	101-68-8	3		5000 (2270)
MEK	78-93-3	4	U159	5000 (2270)
Melphalan	148-82-3	4	U150	1 (0.454)
Mercaptodimethur	2032-65-7	1,4	P199	10 (4.54)
MERCURY AND COMPOUNDS	N.A.	2,3		**
Mercury Compounds	N.A.	2,3		**
Mercuric cyanide	592-04-1	1		1(0.454)
Mercuric nitrate	10045-94-0	1		10 (4.54)
Mercuric sulfate	7783-35-9	1		10 (4.54)
Mercuric thiocyanate	592-85-8	1		10 (4.54)
Mercurous nitrate	10415-75-5	1		10 (4.54)
Mercury	7782-86-7	2,3,4	U151	1 (0.454)
	7439-97-6			
Mercury, (acetato-O)phenyl-	62-38-4	4	P092	100 (45.4)
Mercury fulminate	628-86-4	4	P065	10 (4.54)
Methacrylonitrile	126-98-7	4	U152	1000 (454)
Methanamine, N-methyl-	124-40-3	1,4	U092	1000 (454)
Methanamine, N-methyl-N-nitroso-	62-75-9	2,3,4	P082	10 (4.54)
Methane, bromo-	74-83-9	2,3,4	U029	1000 (454)
Methane, chloro-	74-87-3	2,3,4	U045	100 (45.4)
Methane, chloromethoxy-	107-30-2	3,4	U046	10 (4.54)
Methane, dibromo-	74-95-3	4	U068	1000 (454)
Methane, dichloro-	75-09-2	2,3,4	U080	1000 (454)

Hazardous substance	CASRN I	Statutory code II	RCRA waste No.	Final RQ [pounds (kg)]
Methane, dichlorodifluoro-	75-71-8	4	U075	5000 (2270)
Methane, iodo-	74-88-4	3,4	U138	100 (45.4)
Methane, isocyanato-	624-83-9	3,4	P064	10 (4.54)
Methane, oxybis(chloro-	542-88-1	3,4	P016	10 (4.54)
Methanesulfenyl chloride, trichloro-	594-42-3	4	P118	100 (45.4)
Methanesulfonic acid, ethyl ester	62-50-0	4	U119	1 (0.454)
Methane, tetrachloro-	56-23-5	1,2,3,4	U211	10 (4.54)
Methane, tetranitro-	509-14-8	4	P112	10 (4.54)
Methanethiol	74-93-1	1,4	U153	100 (45.4)
Methane, tribromo-	75-25-2	2,3,4	U225	100 (45.4)
Methane, trichloro-	67-66-3	1,2,3,4	U044	10 (4.54)
Methane, trichlorofluoro-	75-69-4	4	U121	5000 (2270)
Methanimidamide, N,N-dimethyl-N'-[3-[[(methylamino)-carbonyl]oxy]phenyl]-, monohydrochloride	23422-53-9	4	P198	100 (45.4)
Methanimidamide, N,N-dimethyl-N'-[2-methyl-4-[[(methylamino) carbonyl]oxy]phenyl]-	17702-57-7	4	P197	100 (45.4)
6,9-Methano-2,4,3-benzodioxathiepin, 6,7,8,9,10,10-hexachloro-1,5,5a,6,9,9a-hexahydro-, 3-oxide	115-29-7	1,2,4	P050	1 (0.454)
4,7-Methano-1H-indene, 1,4,5,6,7,8,8-heptachloro-3a,4,7,7a-tetrahydro-	76-44-8	1,2,3,4	P059	1 (0.454)
4,7-Methano-1H-indene, 1,2,4,5,6,7,8,8-octachloro-2,3,3a,4,7,7a-hexahydro-	57-74-9	1,2,3,4	U036	1 (0.454)
Methanol	67-56-1	3,4	U154	5000 (2270)
Methapyrilene	91-80-5	4	U155	5000 (2270)
1,3,4-Metheno-2H-cyclobuta[cd]pentalen-2-one, 1,1a,3,3a,4,5,5,5a,5b,6-decachlorooctahydro-	143-50-0	1,4	U142	1 (0.454)
Methiocarb	2032-65-7	1,4	P199	10 (4.54)
Methomyl	16752-77-5	4	P066	100 (45.4)
Methoxychlor	72-43-5	1,3,4	U247	1 (0.454)
Methyl alcohol	67-56-1	3,4	U154	5000 (2270)
2-Methyl aziridine	75-55-8	3,4	P067	1 (0.454)
Methyl bromide	74-83-9	2,3,4	U029	1000 (454)
1-Methylbutadiene	504-60-9	4	U186	100 (45.4)
Methyl chloride	74-87-3	2,3,4	U045	100 (45.4)
Methyl chlorocarbonate	79-22-1	4	U156	1000 (454)
Methyl chloroform	71-55-6	2,3,4	U226	1000 (454)
3-Methylcholanthrene	56-49-5	4	U157	10 (4.54)
4,4'-Methylenebis(2-chloroaniline)	101-14-4	3,4	U158	10 (4.54)
Methylene bromide	74-95-3	4	U068	1000 (454)
Methylene chloride	75-09-2	2,3,4	U080	1000 (454)
4,4'-Methylenedianiline	101-77-9	3		10 (4.54)

Hazardous substance	CASRN I	Statutory code II	RCRA waste No.	Final RQ [pounds (kg)]
Methylene diphenyl diisocyanate	101-68-8	3		5000 (2270)
Methyl ethyl ketone	78-93-3	4	U159	5000 (2270)
Methyl ethyl ketone peroxide	1338-23-4	4	U160	10 (4.54)
Methyl hydrazine	60-34-4	3,4	P068	10 (4.54)
Methyl iodide	74-88-4	3,4	U138	100 (45.4)
Methyl isobutyl ketone	108-10-1	3,4	U161	5000 (2270)
Methyl isocyanate	624-83-9	3,4	P064	10 (4.54)
2-Methyllactonitrile	75-86-5	1,4	P069	10 (4.54)
Methyl mercaptan	74-93-1	1,4	U153	100 (45.4)
Methyl methacrylate	80-62-6	1,3,4	U162	1000 (454)
Methyl parathion	298-00-0	1,4	P071	100 (45.4)
4-Methyl-2-pentanone	108-10-1	3,4	U161	5000 (2270)
Methyl tert-butyl ether	1634-04-4	3		1000 (454)
Methylthiouracil	56-04-2	4	U164	10 (4.54)
Metolcarb	1129-41-5	4	P190	1000 (454)
Mevinphos	7786-34-7	1		10 (4.54)
Mexacarbate	315-18-4	1,4	P128	1000 (454)
Mitomycin C	50-07-7	4	U010	10 (4.54)
MNNG	70-25-7	4	U163	10 (4.54)
Monoethylamine	75-04-7	1		100 (45.4)
Monomethylamine	74-89-5	1		100 (45.4)
Naled	300-76-5	1		10 (4.54)
5,12-Naphthacenedione, 8-acetyl-10-[(3-amino-2,3,6-trideoxy-alpha-L-lyxo-hexopyranosyl)oxy]-7,8,9,10-tetrahydro-6,8,11-trihydroxy-1-methoxy-, (8S-cis)-	20830-81-3	4	U059	10 (4.54)
1-Naphthalenamine	134-32-7	4	U167	100 (45.4)
2-Naphthalenamine	91-59-8	4	U168	10 (4.54)
Naphthalenamine, N,N'-bis(2-chloroethyl)-	494-03-1	4	U026	100 (45.4)
Naphthalene	91-20-3	1,2,3,4	U165	100 (45.4)
Naphthalene, 2-chloro-	91-58-7	2,4	U047	5000 (2270)
1,4-Naphthalenedione	130-15-4	4	U166	5000 (2270)
2,7-Naphthalenedisulfonic acid, 3,3'-[(3,3'-dimethyl-(1,1'-biphenyl)-4,4'-diyl)-bis(azo)]bis(5-amino-4-hydroxy)-tetrasodium salt	72-57-1	4	U236	10 (4.54)
1-Naphthalenol, methylcarbamate	63-25-2	1,3,4	U279	100 (45.4)
Naphthenic acid	1338-24-5	1		100 (45.4)
1,4-Naphthoquinone	130-15-4	4	U166	5000 (2270)
alpha-Naphthylamine	134-32-7	4	U167	100 (45.4)
beta-Naphthylamine	91-59-8	4	U168	10 (4.54)

Hazardous substance	CASRN I	Statutory code II	RCRA waste No.	Final RQ [pounds (kg)]
alpha-Naphthylthiourea	86-88-4	4	P072	100 (45.4)
NICKEL AND COMPOUNDS	N.A.	2,3		**
Nickel III	7440-02-0	2		100 (45.4)
Nickel ammonium sulfate	15699-18-0	1		100 (45.4)
Nickel carbonyl Ni(CO)4, (T-4)-	13463-39-3	4	P073	10 (4.54)
Nickel chloride	7718-54-9 37211-05-5	1		100 (45.4)
Nickel compounds	N.A.	2,3		**
Nickel cyanide Ni(CN)2	557-19-7	4	P074	10 (4.54)
Nickel hydroxide	12054-48-7	1		10 (4.54)
Nickel nitrate	14216-75-2	1		100 (45.4)
Nickel sulfate	7786-81-4	1		100 (45.4)
Nicotine, & salts	54-11-5	4	P075	100 (45.4)
Nitric acid	7697-37-2	1		1000 (454)
Nitric acid, thallium (1 +) salt	10102-45-1	4	U217	100 (45.4)
Nitric oxide	10102-43-9	4	P076	10 (4.54)
p-Nitroaniline	100-01-6	4	P077	5000 (2270)
Nitrobenzene	98-95-3	1,2,3,4	U169	1000 (454)
4-Nitrobiphenyl	92-93-3	3		10 (4.54)
Nitrogen dioxide	10102-44-0 10544-72-6	1,4	P078	10 (4.54)
Nitrogen oxide NO	10102-43-9	4	P076	10 (4.54)
Nitrogen oxide NO2	10102-44-0 10544-72-6	1,4	P078	10 (4.54)
Nitroglycerine	55-63-0	4	P081	10 (4.54)
NITROPHENOLS	25154-55-6	2		**
Nitrophenol (mixed)	25154-55-6	1		100 (45.4)
m-Nitrophenol	554-84-7	1		100 (45.4)
o-Nitrophenol	88-75-5	1,2		100 (45.4)
p-Nitrophenol	100-02-7	1,2,3,4	U170	100 (45.4)
2-Nitrophenol	88-75-5	1,2		100 (45.4)
4-Nitrophenol	100-02-7	1,2,3,4	U170	100 (45.4)
2-Nitropropane	79-46-9	3,4	U171	10 (4.54)
NITROSAMINES	N.A.	2		**
N-Nitrosodi-n-butylamine	924-16-3	4	U172	10 (4.54)
N-Nitrosodiethanolamine	1116-54-7	4	U173	1 (0.454)
N-Nitrosodiethylamine	55-18-5	4	U174	1 (0.454)
N-Nitrosodimethylamine	62-75-9	2,3,4	P082	10 (4.54)
N-Nitrosodiphenylamine	86-30-6	2		100 (45.4)
N-Nitroso-N-ethylurea	759-73-9	4	U176	1 (0.454)
N-Nitroso-N-methylurea	684-93-5	3,4	U177	1 (0.454)

Hazardous substance	CASRN I	Statutory code II	RCRA waste No.	Final RQ [pounds (kg)]
N-Nitroso-N-methylurethane	615-53-2	4	U178	1 (0.454)
N-Nitrosomethylvinylamine	4549-40-0	4	P084	10 (4.54)
N-Nitrosomorpholine	59-89-2	3		1 (0.454)
N-Nitrosopiperidine	100-75-4	4	U179	10 (4.54)
N-Nitrosopyrrolidine	930-55-2	4	U180	1 (0.454)
Nitrotoluene	1321-12-6	1		1000 (454)
m-Nitrotoluene	99-08-1	1		1000 (454)
o-Nitrotoluene	88-72-2	1		1000 (454)
p-Nitrotoluene	99-99-0	1		1000 (454)
5-Nitro-o-toluidine	99-55-8	4	U181	100 (45.4)
Octamethylpyrophosphoramide	152-16-9	4	P085	100 (45.4)
Osmium oxide OsO4, (T-4)-	20816-12-0	4	P087	1000 (454)
Osmium tetroxide	20816-12-0	4	P087	1000 (454)
7-Oxabicyclo[221]heptane-2,3-dicarboxylic acid	145-73-3	4	P088	1000 (454)
Oxamyl	23135-22-0	4	P194	100 (45.4)
1,2-Oxathiolane, 2,2-dioxide	1120-71-4	3,4	U193	10 (4.54)
2H-1,3,2-Oxazaphosphorin-2-amine, N,N- bis(2-chloroethyl)tetrahydro-, 2-oxide	50-18-0	4	U058	10 (4.54)
Oxirane	75-21-8	3,4	U115	10 (4.54)
Oxiranecarboxyaldehyde	765-34-4	4	U126	10 (4.54)
Oxirane, (chloromethyl)-	106-89-8	1,3,4	U041	100 (45.4)
Paraformaldehyde	30525-89-4	1		1000 (454)
Paraldehyde	123-63-7	4	U182	1000 (454)
Parathion	56-38-2	1,3,4	P089	10 (4.54)
PCBs	1336-36-3	1,2,3		1 (0.454)
PCNB	82-68-8	3,4	U185	100 (45.4)
Pentachlorobenzene	608-93-5	4	U183	10 (4.54)
Pentachloroethane	76-01-7	4	U184	10 (4.54)
Pentachloronitrobenzene	82-68-8	3,4	U185	100 (45.4)
Pentachlorophenol	87-86-5	1,2,3,4	See F027	10 (4.54)
1,3-Pentadiene	504-60-9	4	U186	100 (45.4)
Perchloroethylene	127-18-4	2,3,4	U210	100 (45.4)
Phenacetin	62-44-2	4	U187	100 (45.4)
Phenanthrene	85-01-8	2		5000 (2270)
Phenol	108-95-2	1,2,3,4	U188	1000 (454)
Phenol, 2-chloro-	95-57-8	2,4	U048	100 (45.4)
Phenol, 4-chloro-3-methyl-	59-50-7	2,4	U039	5000 (2270)
Phenol, 2-cyclohexyl-4,6-dinitro-	131-89-5	4	P034	100 (45.4)
Phenol, 2,4-dichloro-	120-83-2	2,4	U081	100 (45.4)
Phenol, 2,6-dichloro-	87-65-0	4	U082	100 (45.4)

Hazardous substance	CASRN I	Statutory code II	RCRA waste No.	Final RQ [pounds (kg)]
Phenol, 4,4'-(1,2-diethyl-1,2-ethenediyl)bis-, (E)	56-53-1	4	U089	1 (0.454)
Phenol, 2,4-dimethyl-	105-67-9	2,4	U101	100 (45.4)
Phenol, 4-(dimethylamino)-3,5-dimethyl-, 4 methylcarbamate (ester)	315-18-4	1,4	P128	1000 (454)
Phenol, (3,5-dimethyl-4-(methylthio)-, methylcarbamate	2032-65-7	1,4	P199	10 (4.54)
Phenol, 2,4-dinitro-	51-28-5	1,2,3,4	P048	10 (4.54)
Phenol, methyl-	1319-77-3	1,3,4	U052	100 (45.4)
Phenol, 2-methyl-4,6-dinitro-	534-52-1	2,3,4	P047	10 (4.54)
Phenol, 2-methyl-4,6-dinitro-, & salts	534-52-1	3,4	P047	10 (4.54)
Phenol, 2,2'-methylenebis[3,4,6- trichloro-	70-30-4	4	U132	100 (45.4)
Phenol, 2-(1-methylethoxy)-, methylcarbamate	114-26-1	3,4	U411	100 (45.4)
Phenol, 3-(1-methylethyl)-, methyl carbamate	64-00-6	4	P202	10 (4.54)
Phenol, 3-methyl-5-(1-methylethyl)-, methyl carbamate	2631-37-0	4	P201	1000 (454)
Phenol, 2-(1-methylpropyl)-4,6-dinitro-	88-85-7	4	P020	1000 (454)
Phenol, 4-nitro-	100-02-7	1,2,3,4	U170	100 (45.4)
Phenol, pentachloro-	87-86-5	1,2,3,4	See F027	10 (4.54)
Phenol, 2,3,4,6-tetrachloro-	58-90-2	4	See F027	10 (4.54)
Phenol, 2,4,5-trichloro-	95-95-4	1,3,4	See F027	10 (4.54)
Phenol, 2,4,6-trichloro-	88-06-2	1,2,3,4	See F027	10 (4.54)
Phenol, 2,4,6-trinitro-, ammonium salt	131-74-8	4	P009	10 (4.54)
L-Phenylalanine, 4-[bis(2-chloroethyl)amino]-	148-82-3	4	U150	1 (0.454)
p-Phenylenediamine	106-50-3	3		5000 (2270)
Phenylmercury acetate	62-38-4	4	P092	100 (45.4)
Phenylthiourea	103-85-5	4	P093	100 (45.4)
Phorate	298-02-2	4	P094	10 (4.54)
Phosgene	75-44-5	1,3,4	P095	10 (4.54)
Phosphine	7803-51-2	3,4	P096	100 (45.4)
Phosphoric acid	7664-38-2	1		5000 (2270)
Phosphoric acid, diethyl 4-nitrophenyl ester	311-45-5	4	P041	100 (45.4)
Phosphoric acid, lead(2 +) salt (2:3)	7446-27-7	4	U145	10 (4.54)
Phosphorodithioic acid, O,O-diethyl S-[2-(ethylthio)ethyl] ester	298-04-4	1,4	P039	1 (0.454)
Phosphorodithioic acid, O,O-diethyl S-[(ethylthio)methyl] ester	298-02-2	4	P094	10 (4.54)
Phosphorodithioic acid, O,O-diethyl S-methyl ester	3288-58-2	4	U087	5000 (2270)
Phosphorodithioic acid, O,O-dimethyl S-[2(methylamino)-2-oxoethyl] ester	60-51-5	4	P044	10 (4.54)
Phosphorofluoridic acid, bis(1-methylethyl) ester	55-91-4	4	P043	100 (45.4)
Phosphorothioic acid, O,O-diethyl O-(4-nitrophenyl) ester	56-38-2	1,3,4	P089	10 (4.54)
Phosphorothioic acid, O,O-diethyl O-pyrazinyl ester	297-97-2	4	P040	100 (45.4)
Phosphorothioic acid, O-[4-[(dimethylamino) sulfonyl]phenyl] O,O-dimethyl ester	52-85-7	4	P097	1000 (454)

Hazardous substance	CASRN I	Statutory code II	RCRA waste No.	Final RQ [pounds (kg)]
Phosphorothioic acid, O,O-dimethyl O-(4-nitrophenyl) ester	298-00-0	1,4	P071	100 (45.4)
Phosphorus	7723-14-0	1,3		1 (0.454)
Phosphorus oxychloride	10025-87-3	1		1000 (454)
Phosphorus pentasulfide	1314-80-3	1,4	U189	100 (45.4)
Phosphorus sulfide	1314-80-3	1,4	U189	100 (45.4)
Phosphorus trichloride	12/2/7719	1		1000 (454)
Physostigmine	57-47-6	4	P204	100 (45.4)
Physostigmine salicylate	57-64-7	4	P188	100 (45.4)
PHTHALATE ESTERS	N.A.	2		**
Phthalic anhydride	85-44-9	3,4	U190	5000 (2270)
2-Picoline	109-06-8	4	U191	5000 (2270)
Piperidine, 1-nitroso-	100-75-4	4	U179	10 (4.54)
Plumbane, tetraethyl-	78-00-2	1,4	P110	10 (4.54)
POLYCHLORINATED BIPHENYLS	1336-36-3	1,2,3		1 (0.454)
Polycyclic Organic Matter e	N.A.	3		**
POLYNUCLEAR AROMATIC HYDROCARBONS	N.A.	2		**
Potassium arsenate	7784-41-0	1		1 (0.454)
Potassium arsenite	10124-50-2	1		1 (0.454)
Potassium bichromate	7778-50-9	1		10 (4.54)
Potassium chromate	7789-00-6	1		10 (4.54)
Potassium cyanide K(CN)	151-50-8	1,4	P098	10 (4.54)
Potassium hydroxide	1310-58-3	1		1000 (454)
Potassium permanganate	7722-64-7	1		100 (45.4)
Potassium silver cyanide	506-61-6	4	P099	1 (0.454)
Promecarb	2631-37-0	4	P201	1000 (454)
Pronamide	23950-58-5	4	U192	5000 (2270)
Propanal, 2-methyl-2-(methyl- sulfonyl)-, O-[(methylamino)carbonyl] oxime	1646-88-4	4	P203	100 (45.4)
Propanal, 2-methyl-2-(methylthio)-, O-[(methylamino)carbonyl]oxime	116-06-3	4	P070	1 (0.454)
1-Propanamine	107-10-8	4	U194	5000 (2270)
1-Propanamine, N-propyl-	142-84-7	4	U110	5000 (2270)
1-Propanamine, N-nitroso-N-propyl-	621-64-7	2,4	U111	10 (4.54)
Propane, 1,2-dibromo-3-chloro-	96-12-8	3,4	U066	1 (0.454)
Propane, 1,2-dichloro-	78-87-5	1,2,3,4	U083	1000 (454)
Propanedinitrile	109-77-3	4	U149	1000 (454)
Propanenitrile	107-12-0	4	P101	10 (4.54)
Propanenitrile, 3-chloro-	542-76-7	4	P027	1000 (454)
Propanenitrile, 2-hydroxy-2-methyl-	75-86-5	1,4	P069	10 (4.54)
Propane, 2-nitro-	79-46-9	3,4	U171	10 (4.54)

Hazardous substance	CASRN I	Statutory code II	RCRA waste No.	Final RQ [pounds (kg)]
Propane, 2,2'-oxybis[2-chloro-	108-60-1	2,4	U027	1000 (454)
1,3-Propane sultone	1120-71-4	3,4	U193	10 (4.54)
1,2,3-Propanetriol, trinitrate	55-63-0	4	P081	10 (4.54)
Propanoic acid, 2-(2,4,5-trichlorophenoxy)-	93-72-1	1,4	See F027	100 (45.4)
1-Propanol, 2,3-dibromo-, phosphate (3:1)	126-72-7	4	U235	10 (4.54)
1-Propanol, 2-methyl-	78-83-1	4	U140	5000 (2270)
2-Propanone	67-64-1	4	U002	5000 (2270)
2-Propanone, 1-bromo-	598-31-2	4	P017	1000 (454)
Propargite	2312-35-8	1		10 (4.54)
Propargyl alcohol	107-19-7	4	P102	1000 (454)
2-Propenal	107-02-8	1,2,3,4	P003	1 (0.454)
2-Propenamide	79-06-1	3,4	U007	5000 (2270)
1-Propene, 1,3-dichloro-	542-75-6	1,2,3,4	U084	100 (45.4)
1-Propene, 1,1,2,3,3,3-hexachloro-	1888-71-7	4	U243	1000 (454)
2-Propenenitrile	107-13-1	1,2,3,4	U009	100 (45.4)
2-Propenenitrile, 2-methyl-	126-98-7	4	U152	1000 (454)
2-Propenoic acid	79-10-7	3,4	U008	5000 (2270)
2-Propenoic acid, ethyl ester	140-88-5	3,4	U113	1000 (454)
2-Propenoic acid, 2-methyl-, ethyl ester	97-63-2	4	U118	1000 (454)
2-Propenoic acid, 2-methyl-, methyl ester	80-62-6	1,3,4	U162	1000 (454)
2-Propen-1-ol	107-18-6	1,4	P005	100 (45.4)
Propham	122-42-9	4	U373	1000 (454)
beta-Propiolactone	57-57-8	3		10 (4.54)
Propionaldehyde	123-38-6	3		1000 (454)
Propionic acid	79-09-4	1		5000 (2270)
Propionic anhydride	123-62-6	1		5000 (2270)
Propoxur (Baygon)	114-26-1	3,4	U411	100 (45.4)
n-Propylamine	107-10-8	4	U194	5000 (2270)
n-Propyl bromide (nPB)	106-94-5	3		1 (0.454)
Propylene dichloride	78-87-5	1,2,3,4	U083	1000 (454)
Propylene oxide	75-56-9	1,3		100 (45.4)
1,2-Propylenimine	75-55-8	3,4	P067	1 (0.454)
2-Propyn-1-ol	107-19-7	4	P102	1000 (454)
Prosulfocarb	52888-80-9	4	U387	5000 (2270)
Pyrene	129-00-0	2		5000 (2270)
Pyrethrins	121-29-9 121-21-1	1		1 (0.454)

Hazardous substance	CASRN I	Statutory code II	RCRA waste No.	Final RQ [pounds (kg)]
	8003-34-7			
3,6-Pyridazinedione, 1,2-dihydro-	123-33-1	4	U148	5000 (2270)
4-Pyridinamine	504-24-5	4	P008	1000 (454)
Pyridine	110-86-1	4	U196	1000 (454)
Pyridine, 2-methyl-	109-06-8	4	U191	5000 (2270)
Pyridine, 3-(1-methyl-2-pyrrolidinyl)-, (S)-, & salts	54-11-5	4	P075	100 (45.4)
2,4-(1H,3H)-Pyrimidinedione, 5-[bis(2- chloroethyl)amino]-	66-75-1	4	U237	10 (4.54)
4(1H)-Pyrimidinone, 2,3-dihydro-6-methyl-2-thioxo-	56-04-2	4	U164	10 (4.54)
Pyrrolidine, 1-nitroso-	930-55-2	4	U180	1 (0.454)
Pyrrolo[2,3-b]indol-5-ol, 1,2,3,3a,8,8a- hexahydro-1,3a,8-trimethyl-, methylcarbamate (ester), (3aS-cis)-	57-47-6	4	P204	100 (45.4)
Quinoline	91-22-5	1,3		5000 (2270)
Quinone	106-51-4	3,4	U197	10 (4.54)
Quintobenzene	82-68-8	3,4	U185	100 (45.4)
Radionuclides (including radon)	N.A.	3		§
Reserpine	50-55-5	4	U200	5000 (2270)
Resorcinol	108-46-3	1,4	U201	5000 (2270)
Safrole	94-59-7	4	U203	100 (45.4)
SELENIUM AND COMPOUNDS	N.A.	2,3		**
Selenium Compounds	N.A.	2,3		**
Selenious acid	7783-00-8	4	U204	10 (4.54)
Selenious acid, dithallium (1 +) salt	12039-52-0	4	P114	1000 (454)
Selenium III	7782-49-2	2		100 (45.4)
Selenium dioxide	8/4/7746	1,4	U204	10 (4.54)
Selenium oxide	8/4/7746	1		10 (4.54)
Selenium sulfide SeS2	7488-56-4	4	U205	10 (4.54)
Selenourea	630-10-4	4	P103	1000 (454)
L-Serine, diazoacetate (ester)	115-02-6	4	U015	1 (0.454)
SILVER AND COMPOUNDS	N.A.	2		**
Silver III	7440-22-4	2		1000 (454)
Silver cyanide Ag(CN)	506-64-9	4	P104	1 (0.454)
Silver nitrate	7761-88-8	1		1 (0.454)
Silvex (2,4,5-TP)	93-72-1	1,4	See F027	100 (45.4)
Sodium	7440-23-5	1		10 (4.54)
Sodium arsenate	7631-89-2	1		1 (0.454)
Sodium arsenite	7784-46-5	1		1 (0.454)
Sodium azide	26628-22-8	4	P105	1000 (454)
Sodium bichromate	10588-01-9	1		10 (4.54)
Sodium bifluoride	1333-83-1	1		100 (45.4)

Hazardous substance	CASRN I	Statutory code II	RCRA waste No.	Final RQ [pounds (kg)]
Sodium bisulfite	7631-90-5	1		5000 (2270)
Sodium chromate	11/3/7775	1		10 (4.54)
Sodium cyanide Na(CN)	143-33-9	1,4	P106	10 (4.54)
Sodium dodecylbenzenesulfonate	25155-30-0	1		1000 (454)
Sodium fluoride	7681-49-4	1		1000 (454)
Sodium hydrosulfide	16721-80-5	1		5000 (2270)
Sodium hydroxide	1310-73-2	1		1000 (454)
Sodium hypochlorite	7681-52-9	1		100 (45.4)
	10022-70-5			
Sodium methylate	124-41-4	1		1000 (454)
Sodium nitrite	7632-00-0	1		100 (45.4)
Sodium phosphate, dibasic	7558-79-4	1		5000 (2270)
	10039-32-4			
	10140-65-5			
Sodium phosphate, tribasic	7601-54-9	1		5000 (2270)
	10101-89-0			
	10361-89-4			
Sodium selenite	7782-82-3	1		100 (45.4)
	10102-18-8			
Streptozotocin	18883-66-4	4	U206	1 (0.454)
Strontium chromate	6/2/7789	1		10 (4.54)
Strychnidin-10-one, & salts	57-24-9	1,4	P108	10 (4.54)
Strychnidin-10-one, 2,3-dimethoxy-	357-57-3	4	P018	100 (45.4)
Strychnine, & salts	57-24-9	1,4	P108	10 (4.54)
Styrene	100-42-5	1,3		1000 (454)
Styrene oxide	96-09-3	3		100 (45.4)
Sulfuric acid	7664-93-9	1		1000 (454)
	8014-95-7			
Sulfuric acid, dimethyl ester	77-78-1	3,4	U103	100 (45.4)
Sulfuric acid, dithallium (1 +) salt	7446-18-6	1,4	P115	100 (45.4)
	10031-59-1			
Sulfur monochloride	12771-08-3	1		1000 (454)
Sulfur phosphide	1314-80-3	1,4	U189	100 (45.4)
2,4,5-T	93-76-5	1,4	See F027	1000 (454)
2,4,5-T acid	93-76-5	1,4	See F027	1000 (454)
2,4,5-T amines	2008-46-0	1		5000 (2270)
	1319-72-8			
	3813-14-7			
	6369-96-6			
	6369-97-7			
2,4,5-T esters	93-79-8	1		1000 (454)
	1928-47-8			
	2545-59-7			
	25168-15-4			

Hazardous substance	CASRN I	Statutory code II	RCRA waste No.	Final RQ [pounds (kg)]
	61792-07-2			
2,4,5-T salts	13560-99-1	1		1000 (454)
TCDD	1746-01-6	2,3		1 (0.454)
TDE	72-54-8	1,2,4	U060	1 (0.454)
1,2,4,5-Tetrachlorobenzene	95-94-3	4	U207	5000 (2270)
2,3,7,8-Tetrachlorodibenzo-p-dioxin	1746-01-6	2,3		1 (0.454)
1,1,1,2-Tetrachloroethane	630-20-6	4	U208	100 (45.4)
1,1,2,2-Tetrachloroethane	79-34-5	2,3,4	U209	100 (45.4)
Tetrachloroethylene	127-18-4	2,3,4	U210	100 (45.4)
2,3,4,6-Tetrachlorophenol	58-90-2	4	See F027	10 (4.54)
Tetraethyl pyrophosphate	107-49-3	1,4	P111	10 (4.54)
Tetraethyl lead	78-00-2	1,4	P110	10 (4.54)
Tetraethyldithiopyrophosphate	3689-24-5	4	P109	100 (45.4)
Tetrahydrofuran	109-99-9	4	U213	1000 (454)
Tetranitromethane	509-14-8	4	P112	10 (4.54)
Tetraphosphoric acid, hexaethyl ester	757-58-4	4	P062	100 (45.4)
THALLIUM AND COMPOUNDS	N.A.	2		**
Thallic oxide	1314-32-5	4	P113	100 (45.4)
Thallium III	7440-28-0	2		1000 (454)
Thallium (I) acetate	563-68-8	4	U214	100 (45.4)
Thallium (I) carbonate	6533-73-9	4	U215	100 (45.4)
Thallium chloride TlCl	7791-12-0	4	U216	100 (45.4)
Thallium (I) nitrate	10102-45-1	4	U217	100 (45.4)
Thallium oxide Tl2O3	1314-32-5	4	P113	100 (45.4)
Thallium (I) selenite	12039-52-0	4	P114	1000 (454)
Thallium (I) sulfate	7446-18-6 10031-59-1	1,4	P115	100 (45.4)
Thioacetamide	62-55-5	4	U218	10 (4.54)
Thiodicarb	59669-26-0	4	U410	100 (45.4)
Thiodiphosphoric acid, tetraethyl ester	3689-24-5	4	P109	100 (45.4)
Thiofanox	39196-18-4	4	P045	100 (45.4)
Thioimidodicarbonic diamide [(H2N)C(S)] 2NH	541-53-7	4	P049	100 (45.4)
Thiomethanol	74-93-1	1,4	U153	100 (45.4)
Thioperoxydicarbonic diamide [(H2N)C(S)] 2S2, tetramethyl-	137-26-8	4	U244	10 (4.54)
Thiophanate-methyl	23564-05-8	4	U409	10 (4.54)
Thiophenol	108-98-5	4	P014	100 (45.4)
Thiosemicarbazide	79-19-6	4	P116	100 (45.4)
Thiourea	62-56-6	4	U219	10 (4.54)
Thiourea, (2-chlorophenyl)-	5344-82-1	4	P026	100 (45.4)
Thiourea, 1-naphthalenyl-	86-88-4	4	P072	100 (45.4)
Thiourea, phenyl-	103-85-5	4	P093	100 (45.4)

Hazardous substance	CASRN I	Statutory code II	RCRA waste No.	Final RQ [pounds (kg)]
Thiram	137-26-8	4	U244	10 (4.54)
Tirpate	26419-73-8	4	P185	100 (45.4)
Titanium tetrachloride	7550-45-0	3		1000 (454)
Toluene	108-88-3	1,2,3,4	U220	1000 (454)
Toluenediamine	95-80-7	3,4	U221	10 (4.54)
	496-72-0			
	823-40-5			
	25376-45-8			
2,4-Toluene diamine	95-80-7	3,4	U221	10 (4.54)
	496-72-0			
	823-40-5			
	25376-45-8			
Toluene diisocyanate	91-08-7	3,4	U223	100 (45.4)
	584-84-9			
	26471-62-5			
2,4-Toluene diisocyanate	91-08-7	3,4	U223	100 (45.4)
	584-84-9			
	26471-62-5			
o-Toluidine	95-53-4	3,4	U328	100 (45.4)
p-Toluidine	106-49-0	4	U353	100 (45.4)
o-Toluidine hydrochloride	636-21-5	4	U222	100 (45.4)
Toxaphene	8001-35-2	1,2,3,4	P123	1 (0.454)
2,4,5-TP acid	93-72-1	1,4	See F027	100 (45.4)
2,4,5-TP esters	32534-95-5	1		100 (45.4)
Triallate	2303-17-5	4	U389	100 (45.4)
1H-1,2,4-Triazol-3-amine	61-82-5	4	U011	10 (4.54)
Trichlorfon	52-68-6	1		100 (45.4)
1,2,4-Trichlorobenzene	120-82-1	2,3		100 (45.4)
1,1,1-Trichloroethane	71-55-6	2,3,4	U226	1000 (454)
1,1,2-Trichloroethane	79-00-5	2,3,4	U227	100 (45.4)
Trichloroethylene	79-01-6	1,2,3,4	U228	100 (45.4)
Trichloromethanesulfenyl chloride	594-42-3	4	P118	100 (45.4)
Trichloromonofluoromethane	75-69-4	4	U121	5000 (2270)
Trichlorophenol	25167-82-2	1,2		10 (4.54)
2,3,4-Trichlorophenol	15950-66-0	1,2		10 (4.54)
2,3,5-Trichlorophenol	933-78-8	1,2		10 (4.54)
2,3,6-Trichlorophenol	933-75-5	1,2		10 (4.54)
2,4,5-Trichlorophenol	95-95-4	1,2,3,4	See F027	10 (4.54)
2,4,6-Trichlorophenol	88-06-2	1,2,3,4	See F027	10 (4.54)
3,4,5-Trichlorophenol	609-19-8	1,2		10 (4.54)
Triethanolamine dodecylbenzenesulfonate	27323-41-7	1		1000 (454)

Hazardous substance	CASRN I	Statutory code II	RCRA waste No.	Final RQ [pounds (kg)]
Triethylamine	121-44-8	1,3,4	U404	5000 (2270)
Trifluralin	1582-09-8	3		10 (4.54)
Trimethylamine	75-50-3	1		100 (45.4)
2,2,4-Trimethylpentane	540-84-1	3		1000 (454)
1,3,5-Trinitrobenzene	99-35-4	4	U234	10 (4.54)
1,3,5-Trioxane, 2,4,6-trimethyl-	123-63-7	4	U182	1000 (454)
Tris(2,3-dibromopropyl) phosphate	126-72-7	4	U235	10 (4.54)
Trypan blue	72-57-1	4	U236	10 (4.54)
Unlisted Hazardous Wastes Characteristic of Corrosivity	N.A.	4	D002	100 (45.4)
Unlisted Hazardous Wastes Characteristic of Ignitability	N.A.	4	D001	100 (45.4)
Unlisted Hazardous Wastes Characteristic of Reactivity	N.A.	4	D003	100 (45.4)
Unlisted Hazardous Wastes Characteristic of Toxicity				
Arsenic (D004)	N.A.	4	D004	1 (0.454)
Barium (D005)	N.A.	4	D005	1000 (454)
Benzene (D018)	N.A.	1,2,3,4	D018	10 (4.54)
Cadmium (D006)	N.A.	4	D006	10 (4.54)
Carbon tetrachloride (D019)	N.A.	1,2,4	D019	10 (4.54)
Chlordane (D020)	N.A.	1,2,4	D020	1 (0.454)
Chlorobenzene (D021)	N.A.	1,2,4	D021	100 (45.4)
Chloroform (D022)	N.A.	1,2,4	D022	10 (4.54)
Chromium (D007)	N.A.	4	D007	10 (4.54)
o-Cresol (D023)	N.A.	4	D023	100 (45.4)
m-Cresol (D024)	N.A.	4	D024	100 (45.4)
p-Cresol (D025)	N.A.	4	D025	100 (45.4)
Cresol (D026)	N.A.	4	D026	100 (45.4)
2,4-D (D016)	N.A.	1,4	D016	100 (45.4)
1,4-Dichlorobenzene (D027)	N.A.	1,2,4	D027	100 (45.4)
1,2-Dichloroethane (D028)	N.A.	1,2,4	D028	100 (45.4)
1,1-Dichloroethylene (D029)	N.A.	1,2,4	D029	100 (45.4)
2,4-Dinitrotoluene (D030)	N.A.	1,2,4	D030	10 (4.54)
Endrin (D012)	N.A.	1,4	D012	1 (0.454)
Heptachlor (and epoxide) (D031)	N.A.	1,2,4	D031	1 (0.454)
Hexachlorobenzene (D032)	N.A.	2,4	D032	10 (4.54)
Hexachlorobutadiene (D033)	N.A.	2,4	D033	1 (0.454)
Hexachloroethane (D034)	N.A.	2,4	D034	100 (45.4)
Lead (D008)	N.A.	4	D008	10 (4.54)
Lindane (D013)	N.A.	1,4	D013	1 (0.454)
Mercury (D009)	N.A.	4	D009	1 (0.454)
Methoxychlor (D014)	N.A.	1,4	D014	1 (0.454)
Methyl ethyl ketone (D035)	N.A.	4	D035	5000 (2270)

Hazardous substance	CASRN I	Statutory code II	RCRA waste No.	Final RQ [pounds (kg)]
Nitrobenzene (D036)	N.A.	1,2,4	D036	1000 (454)
Pentachlorophenol (D037)	N.A.	1,2,4	D037	10 (4.54)
Pyridine (D038)	N.A.	4	D038	1000 (454)
Selenium (D010)	N.A.	4	D010	10 (4.54)
Silver (D011)	N.A.	4	D011	1 (0.454)
Tetrachloroethylene (D039)	N.A.	2,4	D039	100 (45.4)
Toxaphene (D015)	N.A.	1,4	D015	1 (0.454)
Trichloroethylene (D040)	N.A.	1,2,4	D040	100 (45.4)
2,4,5-Trichlorophenol (D041)	N.A.	1,4	D041	10 (4.54)
2,4,6-Trichlorophenol (D042)	N.A.	1,2,4	D042	10 (4.54)
2,4,5-TP (D017)	N.A.	1,4	D017	100 (45.4)
Vinyl chloride (D043)	N.A.	2,3,4	D043	1 (0.454)
Uracil mustard	66-75-1	4	U237	10 (4.54)
Uranyl acetate	541-09-3	1		100 (45.4)
Uranyl nitrate	10102-06-4 36478-76-9	1		100 (45.4)
Urea, N-ethyl-N-nitroso-	759-73-9	4	U176	1 (0.454)
Urea, N-methyl-N-nitroso-	684-93-5	3,4	U177	1 (0.454)
Urethane	51-79-6	3,4	U238	100 (45.4)
Vanadic acid, ammonium salt	7803-55-6	4	P119	1000 (454)
Vanadium oxide V2O5	1314-62-1	1,4	P120	1000 (454)
Vanadium pentoxide	1314-62-1	1,4	P120	1000 (454)
Vanadyl sulfate	27774-13-6	1		1000 (454)
Vinyl acetate	108-05-4	1,3		5000 (2270)
Vinyl acetate monomer	108-05-4	1,3		5000 (2270)
Vinylamine, N-methyl-N-nitroso-	4549-40-0	4	P084	10 (4.54)
Vinyl bromide	593-60-2	3		100 (45.4)
Vinyl chloride	75-01-4	2,3,4	U043	1 (0.454)
Vinylidene chloride	75-35-4	1,2,3,4	U078	100 (45.4)
Warfarin, & salts	81-81-2	4	P001, U248	100 (45.4)
Xylene (mixed)	1330-20-7	1,3,4	U239	100 (45.4)
Xylenes (isomers and mixture)	1330-20-7	1,3,4	U239	100 (45.4)
Xylene	1330-20-7	1,3,4	U239	100 (45.4)
m-Xylene	108-38-3	3		1000 (454)
o-Xylene	95-47-6	3		1000 (454)
p-Xylene	106-42-3	3		100 (45.4)
Xylenol	1300-71-6	1		1000 (454)
Yohimban-16-carboxylic acid,11,17-dimethoxy-18-[(3,4,5-trimethoxybenzoyl)oxy]-, methyl ester (3beta,16beta,17alpha, 18beta,20alpha)	50-55-54	4	U200	5000 (2270)

Hazardous substance	CASRN I	Statutory code II	RCRA waste No.	Final RQ [pounds (kg)]
ZINC AND COMPOUNDS	N.A.	2		**
Zinc III	7440-66-6	2		1000 (454)
Zinc acetate	557-34-6	1		1000 (454)
Zinc ammonium chloride	52628-25-8	1		1000 (454)
	14639-97-5			
	14639-98-6			
Zinc, bis(dimethylcarbamodithioato-S,S')-	137-30-4	4	P205	10 (4.54)
Zinc borate	1332-07-6	1		1000 (454)
Zinc bromide	7699-45-8	1		1000 (454)
Zinc carbonate	3486-35-9	1		1000 (454)
Zinc chloride	7646-85-7	1		1000 (454)
Zinc cyanide Zn(CN)2	557-21-1	1,4	P121	10 (4.54)
Zinc fluoride	7783-49-5	1		1000 (454)
Zinc formate	557-41-5	1		1000 (454)
Zinc hydrosulfite	7779-86-4	1		1000 (454)
Zinc nitrate	7779-88-6	1		1000 (454)
Zinc phenolsulfonate	127-82-2	1		5000 (2270)
Zinc phosphide Zn3P2	1314-84-7	1,4	P122, U249	100 (45.4)
Zinc silicofluoride	16871-71-9	1		5000 (2270)
Zinc sulfate	7733-02-0	1		1000 (454)
Ziram	137-30-4	4	P205	10 (4.54)
Zirconium nitrate	13746-89-9	1		5000 (2270)
Zirconium potassium fluoride	16923-95-8	1		1000 (454)
Zirconium sulfate	14644-61-2	1		5000 (2270)
Zirconium tetrachloride	10026-11-6	1		5000 (2270)
F001 - The following spent halogenated solvents used in degreasing; all spent solvent mixtures/blends used in degreasing containing, before use, a total of ten percent or more (by volume) of one or more of the halogenated solvents listed below or those solvents listed in F002, F004, and F005; and still bottoms from the recovery of these spent solvents and spent solvent mixtures		4	F001	10 (4.54)
(a) Tetrachloroethylene	127-18-4	2,3,4	U210	100 (45.4)
(b) Trichloroethylene	79-01-6	1,2,3,4	U228	100 (45.4)
(c) Methylene chloride	75-09-2	2,3,4	U080	1000 (454)
(d) 1,1,1-Trichloroethane	71-55-6	2,3,4	U226	1000 (454)
(e) Carbon tetrachloride	56-23-5	1,2,3,4	U211	10 (4.54)
(f) Chlorinated fluorocarbons	N.A.			5000 (2270)

Hazardous substance	CASRN I	Statutory code II	RCRA waste No.	Final RQ [pounds (kg)]
F002 - The following spent halogenated solvents; all spent solvent mixtures/blends containing, before use, a total of ten percent or more (by volume) of one or more of the halogenated solvents listed below or those solvents listed in F001, F004, or F005; and still bottoms from the recovery of these spent solvents and spent solvent mixtures		4	F002	10 (4.54)
(a) Tetrachloroethylene	127-18-4	2,3,4	U210	100 (45.4)
(b) Methylene chloride	75-09-2	2,3,4	U080	1000 (454)
(c) Trichloroethylene	79-01-6	1,2,3,4	U228	100 (45.4)
(d) 1,1,1-Trichloroethane	71-55-6	2,3,4	U226	1000 (454)
(e) Chlorobenzene	108-90-7	1,2,3,4	U037	100 (45.4)
(f) 1,1,2-Trichloro-1,2,2-trifluoroethane	76-13-1			5000 (2270)
(g) o-Dichlorobenzene	95-50-1	1,2,4	U070	100 (45.4)
(h) Trichlorofluoromethane	75-69-4	4	U121	5000 (2270)
(i) 1,1,2-Trichloroethane	79-00-5	2,3,4	U227	100 (45.4)
F003 - The following spent non-halogenated solvents and the still bottoms from the recovery of these solvents		4	F003	100 (45.4)
(a) Xylene	1330-20-7			1000 (454)
(b) Acetone	67-64-1			5000 (2270)
(c) Ethyl acetate	141-78-6			5000 (2270)
(d) Ethylbenzene	100-41-4			1000 (454)
(e) Ethyl ether	60-29-7			100 (45.4)
(f) Methyl isobutyl ketone	108-10-1			5000 (2270)
(g) n-Butyl alcohol	71-36-3			5000 (2270)
(h) Cyclohexanone	108-94-1			5000 (2270)
(i) Methanol	67-56-1			5000 (2270)
F004 - The following spent non-halogenated solvents and the still bottoms from the recovery of these solvents		4	F004	100 (45.4)
(a) Cresols/Cresylic acid	1319-77-3	1,3,4	U052	100 (45.4)
(b) Nitrobenzene	98-95-3	1,2,3,4	U169	1000 (454)
F005 - The following spent non-halogenated solvents and the still bottoms from the recovery of these solvents		4	F005	100 (45.4)
(a) Toluene	108-88-3	1,2,3,4	U220	1000 (454)
(b) Methyl ethyl ketone	78-93-3	4	U159	5000 (2270)
(c) Carbon disulfide	75-15-0	1,3,4	P022	100 (45.4)
(d) Isobutanol	78-83-1	4	U140	5000 (2270)
(e) Pyridine	110-86-1	4	U196	1000 (454)

Hazardous substance	CASRN I	Statutory code II	RCRA waste No.	Final RQ [pounds (kg)]
F006 - Wastewater treatment sludges from electroplating operations except from the following processes: (1) Sulfuric acid anodizing of aluminum, (2) tin plating on carbon steel, (3) zinc plating (segregated basis) on carbon steel, (4) aluminum or zinc-aluminum plating on carbon steel, (5) cleaning/stripping associated with tin, zinc and aluminum plating on carbon steel, and (6) chemical etching and milling of aluminum		4	F006	10 (4.54)
F007 - Spent cyanide plating bath solutions from electroplating operations.		4	F007	10 (4.54)
F008 - Plating bath residues from the bottom of plating baths from electroplating operations where cyanides are used in the process		4	F008	10 (4.54)
F009 - Spent stripping and cleaning bath solutions from electroplating operations where cyanides are used in the process		4	F009	10 (4.54)
F010 - Quenching bath residues from oil baths from metal heat treating operations where cyanides are used in the process		4	F010	10 (4.54)
F011 - Spent cyanide solutions from salt bath pot cleaning from metal heat treating operations		4	F011	10 (4.54)
F012 - Quenching wastewater treatment sludges from metal heat treating operations where cyanides are used in the process		4	F012	10 (4.54)
F019 - Wastewater treatment sludges from the chemical conversion coating of aluminum except from zirconium phosphating in aluminum can washing when such phosphating is an exclusive conversion coating process . . . Wastewater treatment sludges from the manufacturing of motor vehicles using a zinc phosphating process will not be subject to this listing at the point of generation if the wastes are not placed outside on the land prior to shipment to a landfill for disposal and are either: Disposed in a Subtitle D municipal or industrial landfill unit that is equipped with a single clay liner and is permitted, licensed or otherwise authorized by the state; or disposed in a landfill unit subject to, or otherwise meeting, the landfill requirements in § 258.40, § 264.301 or § 265.301. For the purposes of this listing, motor vehicle manufacturing is defined in § 261.31(b)(4)(i) and § 261.31(b)(4)(ii) describes the recordkeeping requirements for motor vehicle manufacturing facilities		4	F019	10 (4.54)
F020 - Wastes (except wastewater and spent carbon from hydrogen chloride purification) from the production or manufacturing use (as a reactant, chemical intermediate, or component in a formulating process) of tri- or tetrachlorophenol or of intermediates used to produce their pesticide derivatives. (This listing does not include wastes from the production of hexachlorophene from highly purified 2,4,5-trichlorophenol)		4	F020	1 (0.454)
F021 - Wastes (except wastewater and spent carbon from hydrogen chloride purification) from the production or manufacturing use (as a reactant, chemical intermediate, or component in a formulating process) of pentachlorophenol or of intermediates used to produce its derivatives		4	F021	1 (0.454)

Hazardous substance	CASRN I	Statutory code II	RCRA waste No.	Final RQ [pounds (kg)]
F022 - Wastes (except wastewater and spent carbon from hydrogen chloride purification) from the manufacturing use (as a reactant, chemical intermediate, or component in a formulating process) of tetra-, penta-, or hexachlorobenzenes under alkaline conditions		4	F022	1 (0.454)
F023 - Wastes (except wastewater and spent carbon from hydrogen chloride purification) from the production of materials on equipment previously used for the production or manufacturing use (as a reactant, chemical intermediate, or a component in a formulating process) of tri- and tetrachlorophenols. (This listing does not include wastes from equipment used only for the production or use of hexachlorophene from highly purified 2,4,5-trichlorophenol)		4	F023	1 (0.454)
F024 - Process wastes, including but not limited to, distillation residues, heavy ends, tars, and reactor clean-out wastes, from the production of certain chlorinated aliphatic hydrocarbons by free radical catalyzed processes. These chlorinated aliphatic hydrocarbons are those having carbon chain lengths ranging from one to and including five, with varying amounts and positions of chlorine substitution. (This listing does not include wastewaters, wastewater treatment sludges, spent catalysts, and wastes listed in 40 CFR 261.31 or 261.32)		4	F024	1 (0.454)
F025 - Condensed light ends, spent filters and filter aids, and spent desiccant wastes from the production of certain chlorinated aliphatic hydrocarbons, by free radical catalyzed processes. These chlorinated aliphatic hydrocarbons are those having carbon chain lengths ranging from one to and including five, with varying amounts and positions of chlorine substitution		4	F025	1 (0.454)
F026 - Wastes (except wastewater and spent carbon from hydrogen chloride purification) from the production of materials on equipment previously used for the manufacturing use (as a reactant, chemical intermediate, or component in a formulating process) of tetra-, penta-, or hexachlorobenzene under alkaline conditions		4	F026	1 (0.454)
F027 - Discarded unused formulations containing tri-, tetra-, or pentachlorophenol or discarded unused formulations containing compounds derived from these chlorophenols. (This listing does not include formulations containing hexachlorophene synthesized from prepurified 2,4,5- trichlorophenol as the sole component)		4	F027	1 (0.454)
F028 - Residues resulting from the incineration or thermal treatment of soil contaminated with EPA Hazardous Waste Nos. F020, F021, F022, F023, F026, and F027		4	F028	1 (0.454)

Hazardous substance	CASRN I	Statutory code II	RCRA waste No.	Final RQ [pounds (kg)]
F032 - Wastewaters (except those that have not come into contact with process contaminants), process residuals, preservative drippage, and spent formulations from wood preserving processes generated at plants that currently use or have previously used chlorophenolic formulations (except potentially cross-contaminated wastes that have had the F032 waste code deleted in accordance with § 261.35 of this chapter or potentially cross-contaminated wastes that are otherwise currently regulated as hazardous wastes (i.e., F034 or F035), and where the generator does not resume or initiate use of chlorophenolic formulations). This listing does not include K001 bottom sediment sludge from the treatment of wastewater from wood preserving processes that use creosote and/or pentachlorophenol		4	F032	1 (0.454)
F034 - Wastewaters (except those that have not come into contact with process contaminants), process residuals, preservative drippage, and spent formulations from wood preserving processes generated at plants that use creosote formulations. This listing does not include K001 bottom sediment sludge from the treatment of wastewater from wood preserving processes that use creosote and/or pentachlorophenol		4	F034	1 (0.454)
F035 - Wastewaters (except those that have not come into contact with process contaminants), process residuals, preservative drippage, and spent formulations from wood preserving processes generated at plants that use inorganic preservatives containing arsenic or chromium. This listing does not include K001 bottom sediment sludge from the treatment of wastewater from wood preserving processes that use creosote and/or pentachlorophenol		4	F035	1 (0.454)
F037 - Petroleum refinery primary oil/water/solids separation sludge-Any sludge generated from the gravitational separation of oil/water/solids during the storage or treatment of process wastewaters and oily cooling wastewaters from petroleum refineries. Such sludges include, but are not limited to those generated in oil/water/solids separators; tanks and impoundments; ditches and other conveyances; sumps; and stormwater units receiving dry weather flow. Sludges generated in stormwater units that do not receive dry weather flow, sludges generated from non-contact once-through cooling waters segregated for treatment from other process or oily cooling waters, sludges generated in aggressive biological treatment units as defined in § 261.31(b)(2) (including sludges generated in one or more additional units after wastewaters have been treated in aggressive biological treatment units) and K051 wastes are not included in this listing. This listing does include residuals generated from processing or recycling oil-bearing hazardous secondary materials excluded under § 261.4(a)(12)(i), if those residuals are to be disposed of		4	F037	1 (0.454)

Hazardous substance	CASRN I	Statutory code II	RCRA waste No.	Final RQ [pounds (kg)]
F038 - Petroleum refinery secondary (emulsified) oil/water/solids separation sludge-Any sludge and/or float generated from the physical and/or chemical separation of oil/water/solids in process wastewaters and oily cooling wastewaters from petroleum refineries. Such wastes include, but are not limited to, all sludges and floats generated in: Induced air flotation (IAF) units, tanks and impoundments, and all sludges generated in DAF units. Sludges generated in stormwater units that do not receive dry weather flow, sludges generated from non-contact once-through cooling waters segregated for treatment from other process or oily cooling waters, sludges and floats generated in aggressive biological treatment units as defined in § 261.31(b)(2) (including sludges and floats generated in one or more additional units after wastewaters have been treated in aggressive biological treatment units) and F037, K048, and K051 wastes are not included in this listing		4	F038	1 (0.454)
F039 - Leachate (liquids that have percolated through land disposed wastes) resulting from the disposal of more than one restricted waste classified as hazardous under subpart D of 40 CFR part 261. (Leachate resulting from the disposal of one or more of the following EPA Hazardous Wastes and no other hazardous wastes retains its EPA Hazardous Waste Number(s): F020, F021, F022, F026, F027, and/or F028)		4	F039	1 (0.454)
K001 - Bottom sediment sludge from the treatment of wastewaters from wood preserving processes that use creosote and/or pentachlorophenol		4	K001	1 (0.454)
K002 - Wastewater treatment sludge from the production of chrome yellow and orange pigments		4	K002	10 (4.54)
K003 - Wastewater treatment sludge from the production of molybdate orange pigments		4	K003	10 (4.54)
K004 - Wastewater treatment sludge from the production of zinc yellow pigments		4	K004	10 (4.54)
K005 - Wastewater treatment sludge from the production of chrome green pigments		4	K005	10 (4.54)
K006 - Wastewater treatment sludge from the production of chrome oxide green pigments (anhydrous and hydrated)		4	K006	10 (4.54)
K007 - Wastewater treatment sludge from the production of iron blue pigments		4	K007	10 (4.54)
K008 - Oven residue from the production of chrome oxide green pigments		4	K008	10 (4.54)
K009 - Distillation bottoms from the production of acetaldehyde from ethylene		4	K009	10 (4.54)
K010 - Distillation side cuts from the production of acetaldehyde from ethylene		4	K010	10 (4.54)
K011 - Bottom stream from the wastewater stripper in the production of acrylonitrile		4	K011	10 (4.54)
K013 - Bottom stream from the acetonitrile column in the production of acrylonitrile		4	K013	10 (4.54)
K014 - Bottoms from the acetonitrile purification column in the production of acrylonitrile		4	K014	5000 (2270)
K015 - Still bottoms from the distillation of benzyl chloride		4	K015	10 (4.54)
K016 - Heavy ends or distillation residues from the production of carbon tetrachloride		4	K016	1 (0.454)

Hazardous substance	CASRN I	Statutory code II	RCRA waste No.	Final RQ [pounds (kg)]
K017 - Heavy ends (still bottoms) from the purification column in the production of epichlorohydrin		4	K017	10 (4.54)
K018 - Heavy ends from the fractionation column in ethyl chloride production		4	K018	1 (0.454)
K019 - Heavy ends from the distillation of ethylene dichloride in ethylene dichloride production		4	K019	1 (0.454)
K020 - Heavy ends from the distillation of vinyl chloride in vinyl chloride monomer production		4	K020	1 (0.454)
K021 - Aqueous spent antimony catalyst waste from fluoromethanes production		4	K021	10 (4.54)
K022 - Distillation bottom tars from the production of phenol/acetone from cumene		4	K022	1 (0.454)
K023 - Distillation light ends from the production of phthalic anhydride from naphthalene		4	K023	5000 (2270)
K024 - Distillation bottoms from the production of phthalic anhydride from naphthalene		4	K024	5000 (2270)
K025 - Distillation bottoms from the production of nitrobenzene by the nitration of benzene		4	K025	10 (4.54)
K026 - Stripping still tails from the production of methyl ethyl pyridines		4	K026	1000 (454)
K027 - Centrifuge and distillation residues from toluene diisocyanate production		4	K027	10 (4.54)
K028 - Spent catalyst from the hydrochlorinator reactor in the production of 1,1,1-trichloroethane		4	K028	1 (0.454)
K029 - Waste from the product steam stripper in the production of 1,1,1- trichloroethane		4	K029	1 (0.454)
K030 - Column bottoms or heavy ends from the combined production of trichloroethylene and perchloroethylene		4	K030	1 (0.454)
K031 - By-product salts generated in the production of MSMA and cacodylic acid		4	K031	1 (0.454)
K032 - Wastewater treatment sludge from the production of chlordane		4	K032	10 (4.54)
K033 - Wastewater and scrub water from the chlorination of cyclopentadiene in the production of chlordane		4	K033	10 (4.54)
K034 - Filter solids from the filtration of hexachlorocyclopentadiene in the production of chlordane		4	K034	10 (4.54)
K035 - Wastewater treatment sludges generated in the production of creosote		4	K035	1 (0.454)
K036 - Still bottoms from toluene reclamation distillation in the production of disulfoton		4	K036	1 (0.454)
K037 - Wastewater treatment sludges from the production of disulfoton		4	K037	1 (0.454)
K038 - Wastewater from the washing and stripping of phorate production		4	K038	10 (4.54)
K039 - Filter cake from the filtration of diethylphosphorodithioic acid in the production of phorate		4	K039	10 (4.54)
K040 - Wastewater treatment sludge from the production of phorate		4	K040	10 (4.54)
K041 - Wastewater treatment sludge from the production of toxaphene		4	K041	1 (0.454)
K042 - Heavy ends or distillation residues from the distillation of tetrachlorobenzene in the production of 2,4,5-T		4	K042	10 (4.54)

Hazardous substance	CASRN I	Statutory code II	RCRA waste No.	Final RQ [pounds (kg)]
K043 - 2,6-Dichlorophenol waste from the production of 2,4-D		4	K043	10 (4.54)
K044 - Wastewater treatment sludges from the manufacturing and processing of explosives		4	K044	10 (4.54)
K045 - Spent carbon from the treatment of wastewater containing explosives		4	K045	10 (4.54)
K046 - Wastewater treatment sludges from the manufacturing, formulation and loading of lead-based initiating compounds		4	K046	10 (4.54)
K047 - Pink/red water from TNT operations		4	K047	10 (4.54)
K048 - Dissolved air flotation (DAF) float from the petroleum refining industry		4	K048	10 (4.54)
K049 - Slop oil emulsion solids from the petroleum refining industry		4	K049	10 (4.54)
K050 - Heat exchanger bundle cleaning sludge from the petroleum refining industry		4	K050	10 (4.54)
K051 - API separator sludge from the petroleum refining industry		4	K051	10 (4.54)
K052 - Tank bottoms (leaded) from the petroleum refining industry		4	K052	10 (4.54)
K060 - Ammonia still lime sludge from coking operations		4	K060	1 (0.454)
K061 - Emission control dust/sludge from the primary production of steel in electric furnaces		4	K061	10 (4.54)
K062 - Spent pickle liquor generated by steel finishing operations of facilities within the iron and steel industry (SIC Codes 331 and 332)		4	K062	10 (4.54)
K069 - Emission control dust/sludge from secondary lead smelting. (Note: This listing is stayed administratively for sludge generated from secondary acid scrubber systems. The stay will remain in effect until further administrative action is taken. If EPA takes further action effecting the stay, EPA will publish a notice of the action in the Federal Register)		4	K069	10 (4.54)
K071 - Brine purification muds from the mercury cell process in chlorine production, where separately prepurified brine is not used		4	K071	1 (0.454)
K073 - Chlorinated hydrocarbon waste from the purification step of the diaphragm cellprocess using graphite anodes in chlorine production		4	K073	10 (4.54)
K083 - Distillation bottoms from aniline production		4	K083	100 (45.4)
K084 - Wastewater treatment sludges generated during the production of veterinary pharmaceuticals from arsenic or organo-arsenic compounds		4	K084	1 (0.454)
K085 - Distillation or fractionation column bottoms from the production of chlorobenzenes		4	K085	10 (4.54)
K086 - Solvent washes and sludges, caustic washes and sludges, or water washes and sludges from cleaning tubs and equipment used in the formulation of ink from pigments, driers, soaps, and stabilizers containing chromium and lead		4	K086	10 (4.54)
K087 - Decanter tank tar sludge from coking operations		4	K087	100 (45.4)
K088 - Spent potliners from primary aluminum reduction		4	K088	10 (4.54)
K093 - Distillation light ends from the production of phthalic anhydride from ortho-xylene		4	K093	5000 (2270)

Hazardous substance	CASRN I	Statutory code II	RCRA waste No.	Final RQ [pounds (kg)]
K094 - Distillation bottoms from the production of phthalic anhydride from ortho-xylene		4	K094	5000 (2270)
K095 - Distillation bottoms from the production of 1,1,1-trichloroethane		4	K095	100 (45.4)
K096 - Heavy ends from the heavy ends column from the production of 1,1,1-trichloroethane		4	K096	100 (45.4)
K097 - Vacuum stripper discharge from the chlordane chlorinator in the production of chlordane		4	K097	1 (0.454)
K098 - Untreated process wastewater from the production of toxaphene		4	K098	1 (0.454)
K099 - Untreated wastewater from the production of 2,4-D		4	K099	10 (4.54)
K100 - Waste leaching solution from acid leaching of emission control dust/sludge from secondary lead smelting		4	K100	10 (4.54)
K101 - Distillation tar residues from the distillation of aniline-based compounds in the production of veterinary pharmaceuticals from arsenic or organo-arsenic compounds		4	K101	1 (0.454)
K102 - Residue from the use of activated carbon for decolorization in the production of veterinary pharmaceuticals from arsenic or organo-arsenic compounds		4	K102	1 (0.454)
K103 - Process residues from aniline extraction from the production of aniline		4	K103	100 (45.4)
K104 - Combined wastewater streams generated from nitrobenzene/aniline production		4	K104	10 (4.54)
K105 - Separated aqueous stream from the reactor product washing step in the production of chlorobenzenes		4	K105	10 (4.54)
K106 - Wastewater treatment sludge from the mercury cell process in chlorine production		4	K106	1 (0.454)
K107 - Column bottoms from product separation from the production of 1,1- dimethylhydrazine (UDMH) from carboxylic acid hydrazines		4	K107	10 (4.54)
K108 - Condensed column overheads from product separation and condensed reactor vent gases from the production of 1,1- dimethylhydrazine (UDMH) from carboxylic acid hydrazides		4	K108	10 (4.54)
K109 - Spent filter cartridges from product purification from the production of 1,1-dimethylhydrazine (UDMH) from carboxylic acid hydrazides		4	K109	10 (4.54)
K110 - Condensed column overheads from intermediate separation from the production of 1,1-dimethylhydrazine (UDMH) from carboxylic acid hydrazides		4	K110	10 (4.54)
K111 - Product washwaters from the production of dinitrotoluene via nitration of toluene		4	K111	10 (4.54)
K112 - Reaction by-product water from the drying column in the production of toluenediamine via hydrogenation of dinitrotoluene		4	K112	10 (4.54)
K113 - Condensed liquid light ends from the purification of toluenediamine in the production of toluenediamine via hydrogenation of dinitrotoluene		4	K113	10 (4.54)
K114 - Vicinals from the purification of toluenediamine in the production of toluenediamine via hydrogenation of dinitrotoluene		4	K114	10 (4.54)

Hazardous substance	CASRN I	Statutory code II	RCRA waste No.	Final RQ [pounds (kg)]
K115 - Heavy ends from the purification of toluenediamine in the production of toluenediamine via hydrogenation of dinitrotoluene		4	K115	10 (4.54)
K116 - Organic condensate from the solvent recovery column in the production of toluene diisocyanate via phosgenation of toluenediamine		4	K116	10 (4.54)
K117 - Wastewater from the reactor vent gas scrubber in the production of ethylene dibromide via bromination of ethene		4	K117	1 (0.454)
K118 - Spent adsorbent solids from purification of ethylene dibromide in the production of ethylene dibromide via bromination of ethene		4	K118	1 (0.454)
K123 - Process wastewater (including supernates, filtrates, and washwaters) from the production of ethylenebisdithiocarbamic acid and its salts		4	K123	10 (4.54)
K124 - Reactor vent scrubber water from the production of ethylenebisdithiocarbamic acid and its salts		4	K124	10 (4.54)
K125 - Filtration, evaporation, and centrifugation solids from the production of ethylenebisdithiocarbamic acid and its salts		4	K125	10 (4.54)
K126 - Baghouse dust and floor sweepings in milling and packaging operations from the production or formulation of ethylenebisdithiocarbamic acid and its salts		4	K126	10 (4.54)
K131 - Wastewater from the reactor and spent sulfuric acid from the acid dryer from the production of methyl bromide		4	K131	100 (45.4)
K132 - Spent absorbent and wastewater separator solids from the production of methyl bromide		4	K132	1000 (454)
K136 - Still bottoms from the purification of ethylene dibromide in the production of ethylene dibromide via bromination of ethene		4	K136	1 (0.454)
K141 - Process residues from the recovery of coal tar, including, but not limited to, collecting sump residues from the production of coke from coal or the recovery of coke by-products produced from coal This listing does not include K087 (decanter tank tar sludges from coking operations)		4	K141	1 (0.454)
K142 - Tar storage tank residues from the production of coke from coal or from the recovery of coke by-products produced from coal		4	K142	1 (0.454)
K143 - Process residues from the recovery of light oil, including, but not limited to, those generated in stills, decanters, and wash oil recovery units from the recovery of coke by- products produced from coal		4	K143	1 (0.454)
K144 - Wastewater sump residues from light oil refining, including, but not limited to, intercepting or contamination sump sludges from the recovery of coke by-products produced from coal		4	K144	1 (0.454)
K145 - Residues from naphthalene collection and recovery operations from the recovery of coke by-products produced from coal		4	K145	1 (0.454)
K147 - Tar storage tank residues from coal tar refining		4	K147	1 (0.454)
K148 - Residues from coal tar distillation, including, but not limited to, still bottoms		4	K148	1 (0.454)

Hazardous substance	CASRN I	Statutory code II	RCRA waste No.	Final RQ [pounds (kg)]
K149 - Distillation bottoms from the production of alpha-(or methyl-) chlorinated toluenes, ring-chlorinated toluenes, benzoyl chlorides, and compounds with mixtures of these functional groups. [This waste does not include still bottoms from the distillation of benzyl chloride]		4	K149	10 (4.54)
K150 - Organic residuals, excluding spent carbon adsorbent, from the spent chlorine gas and hydrochloric acid recovery processes associated with the production of alpha- (or methyl-) chlorinated toluenes, ring-chlorinated toluenes, benzoyl chlorides, and compounds with mixtures of these functional groups		4	K150	10 (4.54)
K151 - Wastewater treatment sludges, excluding neutralization and biological sludges, generated during the treatment of waste-waters from the production of alpha- (or methyl-) chlorinated toluenes, ring-chlorinated toluenes, benzoyl chlorides, and compounds with mixtures of these functional groups		4	K151	10 (4.54)
K156 - Organic waste (including heavy ends, still bottoms, light ends, spent solvents, filtrates, and decantates) from the production of carbamates and carbamoyl oximes. (This listing does not apply to wastes generated from the manufacture of 3-iodo-2-propynyl n-butylcarbamate)		4	K156	10 (4.54)
K157 - Wastewaters (including scrubber waters, condenser waters, washwaters, and separation waters) from the production of carbamates and carbamoyl oximes. (This listing does not apply to wastes generated from the manufacture of 3-iodo-2-propynyl n-butylcarbamate)		4	K157	10 (4.54)
K158 - Bag house dusts and filter/separation solids from the production of carbamates and carbamoyl oximes. (This listing does not apply to wastes generated from the manufacture of 3-iodo-2-propynyl n-butylcarbamate)		4	K158	10 (4.54)
K159 - Organics from the treatment of thiocarbamate wastes		4	K159	10 (4.54)
K161 - Purification solids (including filtration, evaporation, and centrifugation solids), bag-house dust and floor sweepings from the production of dithiocarbamate acids and their salts. (This listing does not include K125 or K126)		4	K161	1 (0.454)
K169 f - Crude oil storage tank sediment from petroleum refining operations		4	K169	10 (4.54)
K170 f - Clarified slurry oil tank sediment and/or in-line filter/separation solids from petroleum refining operations		4	K170	1 (0.454)
K171 f - Spent hydrotreating catalyst from petroleum refining operations. (This listing does not include inert support media)		4	K171	1 (0.454)
K172 f - Spent hydrorefining catalyst from petroleum refining operations. (This listing does not include inert support media)		4	K172	1 (0.454)
K174 f		4	K174	1 (0.454)
K175 f		4	K175	1 (0.454)
K176 - Baghouse filters from the production of antimony oxide, including filters from the production of intermediates (e.g., antimony metal or crude antimony oxide)		4	K176	1 (0.454)
K177 - Slag from the production of antimony oxide that is speculatively accumulated or disposed, including slag from		4	K177	5000 (2270)

Hazardous substance	CASRN I	Statutory code II	RCRA waste No.	Final RQ [pounds (kg)]
the production of intermediates (e.g., antimony metal or crude antimony oxide)				
K178 - Residues from manufacturing and manufacturing-site storage of ferric chloride from acids formed during the production of titanium dioxide using the chloride-ilmenite process		4	K178	1000 (454)
K181 - Nonwastewaters from the production of dyes and/or pigments (including nonwastewaters commingled at the point of generation with nonwastewaters from other processes) that, at the point of generation, contain mass loadings of any of the constituents identified in paragraph (c) of section 261.32 that are equal to or greater than the corresponding paragraph (c) levels, as determined on a calendar year basis		4	K181	(##)

E.9.3 Hazard Ranking by County

Plan	Ranking
Adams County	Moderate
Barnes County	Very High
Benson County	Moderate
Billings County[1]	Moderate
Bottineau County	Very High
Bowman County[3]	Moderate
Burke County[4]	Moderate
Burleigh County	High
Cass County	Not Mentioned
Cavalier County	Moderate
Dickey County	High
Divide County[4]	Moderate
Dunn County[1]	Moderate
Eddy County[2]	Moderate
Emmons County	High
Foster County	High
GoldenValley County[1]	Moderate
Grand Forks County	High
Grant County	Moderate
Griggs County	Moderate
Hettinger County	High
Kidder County	High
LaMoure County	High
Logan County	Moderate
McHenry County	Moderate
McIntosh County	Moderate
McKenzie County	High
McLean County	Moderate
Mercer County	Moderate
Morton County	Moderate
Mountrail County	High
Nelson County	Moderate
Oliver County	Moderate
Pembina County	Moderate
Pierce County	Moderate
Ramsey County	Moderate
Ransom County	Moderate
Renville County	High
Richland County	High
Rolette County	High

Plan	Ranking
Sargent County	High
Sheridan County	Moderate
Sioux County[5]	Low
Slope County[3]	Moderate
Spirit Lake Nation	Moderate
Stark County[1]	Moderate
Standing Rock Sioux Tribe[5]	Low
Steele County	Low
Stutsman County	High
Three Affiliated Tribes	Moderate
Towner County	Low
Traill County	Low
Turtle Mountain	Moderate
Walsh County	Moderate
Ward County	Moderate
Wells County[2]	Moderate
Williams County	High
City of Bismarck	Not Mentioned

Source: Cumulation of data extracted from local and tribal plans

E.10 Criminal Attack

E.10.1 Vandalism and Theft Claims in State Assets

Member	Total Incurred	Total Paid
Casselton Research Center	$108,725.50	$108,725.50
Minot State University	$9,894.71	$9,894.71
ND State Fair	$19,623.51	$19,623.51

Source: North Dakota Fire and Tornado Fund, 2023

E.10.2 Drug Offense Rated per 1,0000

County	Drug Cases	Drug Arrests	Cases Per 1,000	Arrests Per 1,000
Adams	15	5	6.71	2.24
Barnes	76	52	6.99	4.78
Benson	38	18	6.24	2.96
Billings	No Data	No Data	No Data	No Data
Bottineau	10	5	1.55	0.78
Bowman	10	8	3.31	2.65
Burke	7	4	3.22	1.84
Burleigh	987	741	10.08	7.57
Cass	1264	559	6.91	3.05
Cavalier	8	8	2.15	2.15
Dickey	5	2	1.00	0.40
Divide	9	3	4.10	1.37
Dunn	29	14	7.15	3.45
Eddy	5	No Data	2.10	No Data
Emmons	9	6	2.71	1.81
Foster	9	9	2.65	2.65
Golden Valley	2	1	1.10	0.55
Grand Forks	474	349	6.48	4.77
Grant	1	No Data	0.43	No Data
Griggs	2	No Data	0.89	No Data
Hettinger	7	1	2.80	0.40
Kidder	1	No Data	0.42	No Data
Lamoure	No Data	No Data	No Data	No Data
Logan	2	1	1.10	0.55
McHenry	20	16	3.69	2.95
McIntosh	4	5	1.56	1.95
McKenzie	140	76	10.17	5.52
McLean	75	56	7.66	5.72
Mercer	72	46	8.57	5.47
Morton	149	62	4.53	1.88
Mountrail	69	51	7.10	5.25
Nelson	10	7	3.29	2.31
Oliver	No Data	No Data	No Data	No Data
Pembina	18	7	2.60	1.01
Pierce	8	4	1.98	0.99
Ramsey	106	92	9.11	7.91
Ransom	10	5	1.76	0.88
Renville	No Data	No Data	No Data	No Data
Richland	38	19	2.30	1.15
Rolette	23	18	1.84	1.44
Sargent	1	No Data	0.26	No Data
Sheridan	4	1	3.01	0.75

County	Drug Cases	Drug Arrests	Cases Per 1,000	Arrests Per 1,000
Sioux	3	3	0.75	0.75
Slope	No Data	No Data	No Data	No Data
Stark	217	149	6.63	4.56
Steele	3	3	1.60	1.60
Stutsman	87	67	4.01	3.09
Towner	9	6	4.11	2.74
Traill	8	2	1.00	0.25
Walsh	40	21	3.76	1.98
Ward	446	335	6.40	4.81
Wells	4	3	0.99	0.74
Williams	607	343	15.78	8.92
Grand Total	**5865**	**3736**	**7.58**	**4.83**

Source: North Dakota Office of the Attorney General, 2023

E.10.3 Drug Offenses in 2022 by Agency

Agency	County	Cases	Arrests	Case Change since 2021	Arrest Change Since 2021
Adams Co SO	Adams	15	5	650	--
Barnes Co SO	Barnes	18	14	38%	180
Benson Co SO	Benson	38	18	72.73	12.5
Berthold PD*	Ward	20	19	-16.67	-20.83
Beulah PD*	Mercer	45	35	25	12.9
Billings Co SO	Billings	-	-	-	-
Bismarck PD*	Burleigh	710	454	-32.06	-25.82
Bismarck SC#	Burleigh	2	-	-	-
Bottineau Co SO	Bottineau	10	5	-9.09	-16.67
Bowman Co SO	Bowman	2	2	100	100
Bowman PD*	Bowman	8	6	-33.3	-50
Burke Co SO	Burke	6	4	-60	-69.23
Burleigh Co SO	Burleigh	224	230	-16.42	-9.8
Burlington PD*	Ward	9	4	125	300
Carrington PD*	Foster	9	9	12.5	0
Cass Co SO	Cass	75	21	10.29	-16
Cass Co TF$	Cass	109	45	2.83	4.65
Cavalier Co SO	Cavalier	8	8	-27.27	-11.11
Cavalier PD*	Cavalier	-	-	-	-
Devils Lake PD*	Ramsey	60	54	-28.57	-20.59
Devils Lake TF$	Ramsey	39	34	-77.27	-25.93
Dickey Co SO	Dickey	2	1	0	0
Dickinson PD*	Stark	163	112	-24.54	-33.33
Dickinson TF$	Stark	25	20	-52.83	0
Divide Co SO	Divide	9	3	0	0
Drayton PD*	Pembina	-	-	-	-
Dunn Co SO	Dunn	25	14	-26.47	-44
Dunseith PD*	Rolette	4	4	33.33	0
Eddy Co SO	Eddy	5	0	-44.44	-100
Ellendale PD	Dickey	-	-	-	-
Emerado PD	Dickey	-	-	-	-
Emmons Co SO	Emmons	9	6	-43.75	100
Fargo PD*	Cass	837	315	-17.7	-28.73
Foster Co SO	Foster	-	-	-	-
Garrison PD*	McLean	2	1	-66.67	-75
Golden Valley Co SO	Golden Valley	2	1	-	-
Grafton PD*	Walsh	9	2	50	100
Grand Forks Co SO	Grand Forks	91	57	15.19	23.91
Grand Forks PD	Grand Forks	318	240	-0.31	2.56
Grand Forks TF$	Grand Forks	55	52	-38.89	-38.1
Grant Co SO	Grant	1	0	-	-

Agency	County	Cases	Arrests	Case Change since 2021	Arrest Change Since 2021
Griggs Co SO	Griggs	2	0	-60	0
Harvey PD*	Wells	-	-	-	-
Hazen PD*	Mercer	3	2	-40	-33.33
Hettinger Co SO	Hettinger	7	1	16.67	0
Jamestown PD*	Stutsman	41	34	-38.81	-42.37
Kenmare PD*	Ward	-	-	-	-
Kidder Co SO	Kidder	1	0	-	-
Kildeer PD*	Dunn	4	0	100	-100
Lamoure Co SO	Lamoure	-	-	-	-
LaMoure PD*	Lamoure	-	-	-	-
Lincoln PD*	Burleigh	51	57	15.91	16.33
Lisbon PD*	Ransom	3	1	50	-
Logan Co SO	Logan	2	1	100	0
Mandan PD*	Morton	126	51	-3.08	-29.17
McHenry Co SO	McHenry	20	16	-54.55	-50
McIntosh Co SO	McIntosh	2	2	0	0
McKenzie Co SO	McKenzie	78	38	-30.36	-32.14
McLean Co SO	McLean	73	55	-46.32	-46.6
Medora PD*	Billings	-	-	-	-
Mercer Co SO	Mercer	24	9	-25	-57.14
Metro TF$	Cass	41	29	-26.79	-43.14
Minot PD*	Ward	184	139	25.17	39
Minot TF$	Ward	100	92	7.53	5.75
Morton Co SO	Morton	23	11	4.55	10
Mountrail Co SO	Mountrail	20	30	-31.03	-16.67
ND BCI	State	8	7	-	-
ND SHP	State	661	527	1.85	3.33
ND Tribal	State	-	-	-	-
NDSCS#	Richland	-	-	-	-
NDSU#	Grand Forks	9	-	80	-
Nelson Co SO	Nelson	10	7	100	600
New Town PD*	Mountrail	38	16	72.73	33.33
Northwood PD*	Grand Forks	1	-	-	-
Oakes PD*	Dickey	3	1	-25	-50
Oliver Co SO	Oliver	-	-	-	-
Pembina Co SO	Pembina	18	7	0	-22.22
Pierce Co SO	Pierce	4	2	-20	0
Powers Lake PD*	Burke	1	-	-	-
Ramsey Co SO	Ramsey	7	4	-53.33	-50
Ransom Co SO	Ransom	7	4	75	100
Ray PD*	Williams	-	-	-	-
Renville Co SO	Renville	-	-	-	-

Agency	County	Cases	Arrests	Case Change since 2021	Arrest Change Since 2021
Richland Co SO	Richland	6	2	50	-33.33
Rolette Co SO	Rolette	16	13	45.45	18.18
Rolette PD*	Rolette	3	1	200	-
Rolla PD*	Rolette	-	-	-	-
Rugby PD*	Pierce	4	2	-69.23	-71.43
Sargent Co SO	Sargent	1	0	-	-
SEMCA TF$	State	46	16	-8	-55.56
Sheridan Co SO	Sheridan	4	1	-42.86	-87.5
Sioux Co SO	Sioux	3	3	-25	-25
Slope Co SO	Slope	-	-	-	-
South Sakakawea TF$	State	9	3	-35.71	-66.67
Stanley PD	Mountrail	11	5	1000	150
Stark Co SO	Stark	29	17	-17.14	-10.53
Steele Co SO	Steele	2	2	0	100
Steele PD*	Steele	1	1	-	-
Stutsman Co SO*	Stutsman	10	6	-44.44	-50
Stutsman TF	Stutsman	36	27	-5.26	-20.59
Surrey PD*	Ward	14	8	1300	-
Thomson PD*	Grand Forks	-	-	-	-
Tioga PD*	Williams	3	1	-40	-66.67
Towner Co SO	Towner	9	6	-25	-45.45
Traill Co SO	Traill	8	2	-38.46	-66.67
UND#	Cass	41	37	7.89	54.17
Valley City PD*	Barnes	58	38	48.72	123.53
Wahpeton PD*	Richland	32	17	10.34	-26.09
Walsh Co SO	Walsh	31	19	47.62	46.15
Ward Co SO	Ward	119	73	15.53	15.87
Watford City PD*	McKenzie	62	38	87.88	216.67
Wells Co SO	Wells	4	3	-33.33	50
West Fargo PD*	Cass	161	112	-18.27	-22.22
Williams Co SO	Williams	45	29	55.17	45
Williston PD*	Williams	458	260	44.48	31.31
Williston TF$	Williams	101	53	-22.31	-52.68
Wishek PD*	McIntosh	2	3	-50	0

*- Municipal, #-Educational, $-Task Forces

Source: North Dakota Office of the Attorney General, 2023

E.10.4 Hazard Ranking by County

Plan	Ranking
Adams County	Moderate
Barnes County	High

Plan	Ranking
Benson County	Low
Billings County[1]	Moderate
Bottineau County	Moderate
Bowman County[3]	Moderate
Burke County[4]	Moderate
Burleigh County	Moderate
Cass County	Not Mentioned
Cavalier County	Low
Dickey County	Low
Divide County[4]	Moderate
Dunn County[1]	Moderate
Eddy County[2]	Low
Emmons County	Moderate
Foster County	Low
Golden Valley County[1]	Moderate
Grand Forks County	Moderate
Grant County	Moderate
Griggs County	Low
Hettinger County	Low
Kidder County	Low
LaMoure County	Moderate
Logan County	Moderate
McHenry County	Not Mentioned
McIntosh County	Low
McKenzie County	Moderate
McLean County	Low
Mercer County	Low
Morton County	Moderate
Mountrail County	Not Mentioned
Nelson County	Low
Oliver County	Not Mentioned
Pembina County	Not Mentioned
Pierce County	Moderate
Ramsey County	Not Mentioned
Ransom County	Moderate
Renville County	Moderate
Richland County	Low
Rolette County	Moderate
Sargent County	Low
Sheridan County	Not Mentioned
Sioux County[5]	Low
Slope County[3]	Moderate

Plan	Ranking
Spirit Lake Nation	Low
Stark County[1]	Moderate
Standing Rock Sioux Tribe[5]	Low
Steele County	Low
Stutsman County	Moderate
Three Affiliated Tribes	Moderate
Towner County	Low
Traill County	Low
Turtle Mountain	Low
Walsh County	Low
Ward County	Not Mentioned
Wells County[2]	Low
Williams County	Low
City of Bismarck	Moderate

Source: Cumulation of data extracted from local and tribal plans

E.11 Space Weather

E.11.1 Hazard Ranking by County

Plan	Ranking
Adams County	Moderate
Barnes County	High
Benson County	Not Mentioned
Billings County[1]	Low
Bottineau County	Not Mentioned
Bowman County[3]	Not Mentioned
Burke County[4]	Not Mentioned
Burleigh County	High
Cass County	Not Mentioned
Cavalier County	Not Mentioned
Dickey County	Not Mentioned
Divide County[4]	Not Mentioned
Dunn County[1]	Low
Eddy County[2]	Not Mentioned
Emmons County	High
Foster County	Low
Golden Valley County[1]	Low
Grand Forks County	Low
Grant County	Moderate
Griggs County	High
Hettinger County	Moderate
Kidder County	Moderate
LaMoure County	Moderate
Logan County	Moderate
McHenry County	Not Mentioned
McIntosh County	Moderate
McKenzie County	Moderate
McLean County	Not Mentioned
Mercer County	Moderate
Morton County	High
Mountrail County	Not Mentioned
Nelson County	High
Oliver County	Moderate
Pembina County	Moderate
Pierce County	Not Mentioned
Ramsey County	Not Mentioned
Ransom County	Moderate
Renville County	Not Mentioned
Richland County	Not Mentioned
Rolette County	Not Mentioned

Plan	Ranking
Sargent County	Not Mentioned
Sheridan County	Not Mentioned
Sioux County[5]	Not Mentioned
Slope County[3]	Not Mentioned
Spirit Lake Nation	Not Mentioned
Stark County[1]	Low
Standing Rock Sioux Tribe[5]	Not Mentioned
Steele County	Not Mentioned
Stutsman County	Moderate
Three Affiliated Tribes	Not Mentioned
Towner County	Moderate
Traill County	Not Mentioned
Turtle Mountain	Not Mentioned
Walsh County	Not Mentioned
Ward County	Not Mentioned
Wells County[2]	Not Mentioned
Williams County	Not Mentioned
City of Bismarck	Not Mentioned

Source: Cumulation of data extracted from local and tribal plans

E.12 Geologic Hazards

E.12.1 Hazard Ranking by County

Plan	Ranking
Adams County	Low
Barnes County	Low
Benson County	Low
Billings County[1]	Not Mentioned
Bottineau County	Low
Bowman County[3]	Not Mentioned
Burke County[4]	Low
Burleigh County	Low
Cass County	High
Cavalier County	Moderate
Dickey County	Not Mentioned
Divide County[4]	Low
Dunn County[1]	Not Mentioned
Eddy County[2]	Not Mentioned
Emmons County	Low
Foster County	Low
GoldenValley County[1]	Not Mentioned
Grand Forks County	Low
Grant County	Low
Griggs County	Low
Hettinger County	Not Mentioned
Kidder County	Low
LaMoure County	Low
Logan County	Low
McHenry County	Not Mentioned
McIntosh County	Low
McKenzie County	Moderate
McLean County	Low
Mercer County	Low
Morton County	Moderate
Mountrail County	Low
Nelson County	Low
Oliver County	Low
Pembina County	Not Mentioned
Pierce County	Not Mentioned
Ramsey County	Not Mentioned
Ransom County	Low
Renville County	Low
Richland County	Not Mentioned
Rolette County	Low

Plan	Ranking
Sargent County	Not Mentioned
Sheridan County	Not Mentioned
Sioux County[5]	Not Mentioned
Slope County[3]	Not Mentioned
Spirit Lake Nation	Low
Stark County[1]	Not Mentioned
Standing Rock Sioux Tribe[5]	Not Mentioned
Steele County	Low
Stutsman County	Low
Three Affiliated Tribes	Low
Towner County	Low
Traill County	Not Mentioned
Turtle Mountain	Low
Walsh County	Not Mentioned
Ward County	Not Mentioned
Wells County[2]	Not Mentioned
Williams County	Moderate
City of Bismarck	Low

Source: Cumulation of data extracted from local and tribal plans

E.13 Terrorist or Nation-State Attacks

E.13.1 Population Density by County

County	Population	Area (Sq Mi)	Population Density
Adams County	2,200	987.62	2.23
Barnes County	10,853	1,491.55	7.28
Benson County	5,964	1,388.71	4.29
Billings County	945	1,148.85	0.82
Bottineau County	6,379	1,668.42	3.82
Bowman County	2,993	1,161.81	2.58
Burke County	2,201	1,103.57	1.99
Burleigh County	98,458	1,632.65	60.31
Cass County	184,525	1,764.94	104.55
Cavalier County	3,704	1,488.75	2.49
Dickey County	4,999	1,131.47	4.42
Divide County	2,195	1,260.79	1.74
Dunn County	4,095	2,008.46	2.04
Eddy County	2,347	630.17	3.72
Emmons County	3,301	1,510.44	2.19
Foster County	3,397	635.45	5.35
Golden Valley County	1,736	1,000.79	1.73
Grand Forks County	73,170	1,436.48	50.94
Grant County	2,301	1,659.14	1.39
Griggs County	2,306	708.82	3.25
Hettinger County	2,489	1,132.22	2.20
Kidder County	2,394	1,351.19	1.77
LaMoure County	4,093	1,145.94	3.57
Logan County	1,876	992.82	1.89
McHenry County	5,345	1,873.95	2.85
McIntosh County	2,530	974.73	2.60
McKenzie County	14,704	2,760.32	5.33
McLean County	9,771	2,110.88	4.63
Mercer County	8,350	1,042.96	8.01
Morton County	33,291	1,926.27	17.28
Mountrail County	9,809	1,825.30	5.37
Nelson County	3,015	981.78	3.07
Oliver County	1,877	722.51	2.60
Pembina County	6,844	1,118.69	6.12
Pierce County	3,990	1,018.60	3.92
Ramsey County	11,605	1,186.85	9.78
Ransom County	5,703	862.36	6.61
Renville County	2,282	877.05	2.60

County	Population	Area (Sq Mi)	Population Density
Richland County	16,529	1,435.78	11.51
Rolette County	12,187	903.08	13.49
Sargent County	3,862	858.51	4.50
Sheridan County	1,265	972.38	1.30
Sioux County	3,898	1,094.09	3.56
Slope County	706	1,214.92	0.58
Stark County	33,646	1,334.74	25.21
Steele County	1,798	712.22	2.52
Stutsman County	21,593	2,221.72	9.72
Towner County	2,162	1,024.56	2.11
Traill County	7,997	861.95	9.28
Walsh County	10,563	1,281.93	8.24
Ward County	69,919	2,013.28	34.73
Wells County	3,982	1,271.05	3.13
Williams County	40,950	2,077.40	19.71

Source: U.S. Census Bureau, 2020

E.13.2 Hazard Ranking by County

Plan	Ranking
Adams County	Moderate
Barnes County	High
Benson County	Low
Billings County[1]	Moderate
Bottineau County	Moderate
Bowman County[3]	Moderate
Burke County[4]	Moderate
Burleigh County	Moderate
Cass County	Not Mentioned
Cavalier County	Low
Dickey County	Low
Divide County[4]	Moderate
Dunn County[1]	Moderate
Eddy County[2]	Low
Emmons County	Moderate
Foster County	Low
GoldenValley County[1]	Moderate
Grand Forks County	Moderate
Grant County	Moderate
Griggs County	Low
Hettinger County	Low
Kidder County	Low
LaMoure County	Moderate
Logan County	Moderate
McHenry County	Not Mentioned
McIntosh County	Low
McKenzie County	Moderate
McLean County	Low
Mercer County	Low
Morton County	Moderate
Mountrail County	Not Mentioned
Nelson County	Low
Oliver County	Not Mentioned
Pembina County	Not Mentioned
Pierce County	Moderate
Ramsey County	Not Mentioned
Ransom County	Moderate
Renville County	Moderate
Richland County	Low
Rolette County	Moderate
Sargent County	Low

Plan	Ranking
Sheridan County	Not Mentioned
Sioux County[5]	Low
Slope County[3]	Moderate
Spirit Lake Nation	Low
Stark County[1]	Moderate
Standing Rock Sioux Tribe[5]	Low
Steele County	Low
Stutsman County	Moderate
Three Affiliated Tribes	Moderate
Towner County	Low
Traill County	Low
Turtle Mountain	Low
Walsh County	Low
Ward County	Not Mentioned
Wells County[2]	Low
Williams County	Low
City of Bismarck	Moderate

Source: Cumulation of data extracted from local and tribal plans

E.14 Civil Disturbance

E.14.1 Hazard Ranking by County

Plan	Ranking
Adams County	Moderate
Barnes County	Moderate
Benson County	Not Mentioned
Billings County[1]	Moderate
Bottineau County	Not Mentioned
Bowman County[3]	Not Mentioned
Burke County[4]	Not Mentioned
Burleigh County	Moderate
Cass County	Not Mentioned
Cavalier County	Not Mentioned
Dickey County	Not Mentioned
Divide County[4]	Not Mentioned
Dunn County[1]	Moderate
Eddy County[2]	Not Mentioned
Emmons County	Moderate
Foster County	Low
Golden Valley County[1]	Moderate
Grand Forks County	High
Grant County	Moderate
Griggs County	Low
Hettinger County	Not Mentioned
Kidder County	Low
LaMoure County	Moderate
Logan County	Moderate
McHenry County	Not Mentioned
McIntosh County	Low
McKenzie County	Moderate
McLean County	Not Mentioned
Mercer County	Low
Morton County	Moderate
Mountrail County	Low
Nelson County	Low
Oliver County	Not Mentioned
Pembina County	Low
Pierce County	Not Mentioned
Ramsey County	Not Mentioned
Ransom County	Moderate
Renville County	Not Mentioned
Richland County	Not Mentioned
Rolette County	Not Mentioned

Plan	Ranking
Sargent County	Not Mentioned
Sheridan County	Not Mentioned
Sioux County[5]	Not Mentioned
Slope County[3]	Not Mentioned
Spirit Lake Nation	Not Mentioned
Stark County[1]	Moderate
Standing Rock Sioux Tribe[5]	Not Mentioned
Steele County	Not Mentioned
Stutsman County	Moderate
Three Affiliated Tribes	Not Mentioned
Towner County	Low
Traill County	Not Mentioned
Turtle Mountain	Not Mentioned
Walsh County	Moderate
Ward County	Not Mentioned
Wells County[2]	Not Mentioned
Williams County	Not Mentioned
City of Bismarck	Moderate

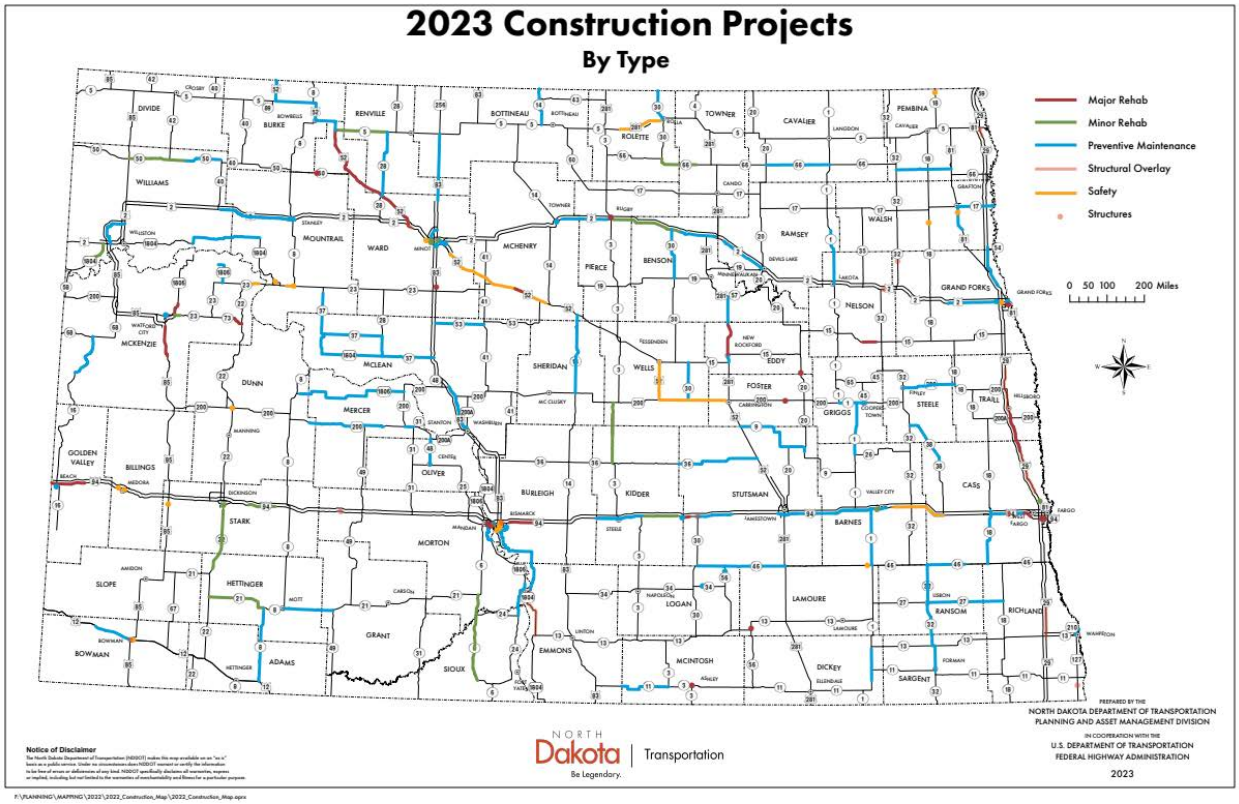
Source: Cumulation of data extracted from local and tribal plans

E.15 Transportation Incident

E.15.1 Historic Occurrences

- **1906:** Charles Service of Park River becomes North Dakota's first motor vehicle fatality (eReference Desk, 2023).
- **1945:** Michigan, North Dakota train wreck kills 34 people, including 19 service members, and injured 312 (Bonham, 2012).
- **1942:** The earliest aviation injury recorded in the state occurred in Bismarck on Northwest Airlines Flight 2 providing service to Chicago from Seattle with several stops, including Bismarck (Civil Aeronautics Board, 1942). Gusty conditions during landing led to the plane skipping off the runway, injuring the captain's leg, but leaving all passengers unharmed (Civil Aeronautics Board, 1942).
- **1968:** Eight teenagers are killed in a two-vehicle accident just west of Jamestown, still the highest-fatality motor-vehicle accident in the state. One teenager survived the incident, for which speed and alcohol were seen as contributors. (Bismarck Tribune, 2008).
- **1972:** North Dakota experiences an attempted airplane hijacking by three Paraguayan-born Germans at the airport in Grand Forks in the midst of debates about more stringent airport safety policies to avoid hijackings (Midboe Collection, 1972)
- **2002:** A Minot train accident leads to a significant spill of anhydrous ammonia, sending 60 to the emergency room (Witte, 2002). Remediation would cost $6.1 million (Witte, 2002).
- **2013:** A Tesoro Corporation pipeline break in a wheat field in September spilled 840,000 gallons of crude oil, one of the largest ever on-shore spills in the nation (The Associated Press, 2016).
- **2016:** The Little Missouri River and a tributary were contaminated when a pipeline ruptured, spilling 600,000 gallons of crude oil in Belle Fourche (Sisk, 2022).

E.15.2 2023 Construction Projects



E.15.3 Motor Vehicle Crashes, Injuries, and Fatalities by County

County	Crashes	Fatalities	Injuries	Crash Rate per Million Vehicle Miles Traveled
Adams	16	1	4	0.52
Barnes	143	1	65	0.62
Benson	17	4	23	0.21
Billings	15	1	11	0.2
Bottineau	54	1	27	0.6
Bowman	9	0	7	0.18
Burke	18	0	8	0.31
Burleigh	2,082	8	729	2.92
Cass	2,448	11	1,143	1.47
Cavalier	22	0	10	0.42
Dickey	36	1	20	0.65
Divide	20	0	8	0.36
Dunn	71	2	42	0.48
Eddy	15	0	4	0.53
Emmons	34	0	22	0.64
Foster	26	0	14	0.55
Golden Valley	8	0	3	0.19
Grand Forks	928	8	356	1.5
Grant	12	0	7	0.35
Griggs	8	0	5	0.28
Hettinger	14	0	7	0.39
Kidder	56	1	21	0.51
Lamoure	27	0	12	0.5
Logan	12	0	5	0.53
McHenry	45	4	29	0.36
McIntosh	22	1	12	0.83
McKenzie	175	4	75	0.46
McLean	85	2	37	0.4
Mercer	62	1	36	0.74
Morton	418	7	154	0.94
Mountrail	66	8	39	0.29
Nelson	25	0	20	0.39
Oliver	4	0	2	0.12
Pembina	54	0	30	0.53
Pierce	23	0	12	0.46
Ramsey	114	0	31	0.87
Ransom	26	0	12	0.49
Renville	13	0	12	0.34
Richland	161	3	85	0.54

County	Crashes	Fatalities	Injuries	Crash Rate per Million Vehicle Miles Traveled
Rolette	22	12	24	0.23
Sargent	8	1	6	0.14
Sheridan	15	1	10	0.63
Sioux	3	2	3	0.1
Slope	8	0	2	0.27
Stark	422	3	79	1.1
Steele	7	1	2	0.19
Stutsman	343	1	118	1.07
Towner	9	0	2	0.28
Traill	82	1	33	0.41
Walsh	85	2	29	0.58
Ward	725	3	339	1.07
Wells	25	0	15	0.35
Williams	447	5	146	0.85
Total	**9,585**	**101**	**3,947**	**1.03**

Source: North Dakota Department of Transportation, Vision Zero, 2021

E.15.4 BUILD Grade Raising Projects

Highway No	Reference Point	Grade Raise Project	PCN	Estimate Cost
52	130	BGR-NH-4-052(096)128	23032	$8,900,000
83	184	BGR-NH-4-083(154)184	23028	$2,500,000
50	88	BGR-SS-4-050(007)088	23138	$1,100,000
3	123	BGR-NH-1-003(053)123	23029	$1,400,000
3	130	BGR-NH-1-003(053)123	23029	$1,600,000
3	137	BGR-NH-1-003(053)123	23029	$2,300,000
20	54.8	BGR-SS-3-020(137)054	23031	$2,000,000
20	56.5	BGR-SS-3-020(137)054	23031	$1,100,000
14	36.917	BGR-SS-1-014(013)036	23033	$5,900,000
14	39.2	BGR-SS-1-014(013)036	23033	$3,000,000
14	39.7/39.825	BGR-SS-1-014(013)036	23033	$2,300,000
13	264.2	NH-2-013(260)	23170	$1,500,000
13	265.3	NH-2-013(260)	23170	$1,300,000
13	265.8	NH-2-013(260)	23170	$860,000
94	223	BGR-IM-2-094(179)223	23035	$14,770,000
			Total	$50,530,000

Source: North Dakota Department of Transportation, 2023

E.15.5 Pipeline Mileage by Type and County

County	Gas Transmission	Hazardous Liquid	Total Mileage	Percent
Adams	0.00	0.00	0.00	0.00%
Barnes	93.87	145.97	239.83	2.98%
Benson	20.76	33.34	54.10	0.67%
Billings	90.58	151.36	241.94	3.01%
Bottineau	33.42	84.04	117.46	1.46%
Bowman	84.75	19.41	104.16	1.30%
Burke	84.69	65.70	150.39	1.87%
Burleigh	67.59	35.78	103.38	1.29%
Cass	72.71	140.05	212.76	2.65%
Cavalier	42.29	7.35	49.64	0.62%
Dickey	0.00	25.63	25.63	0.32%
Divide	1.78	129.10	130.87	1.63%
Dunn	108.60	338.49	447.08	5.56%
Eddy	24.86	25.72	50.57	0.63%
Emmons	43.15	46.65	89.80	1.12%
Foster	49.49	53.03	102.52	1.28%
Golden Valley	65.68	34.97	100.65	1.25%
Grand Forks	0.56	60.87	61.43	0.76%
Grant	3.97	0.00	3.97	0.05%
Griggs	0.00	28.48	28.48	0.35%
Hettinger	76.78	0.00	76.78	0.96%
Kidder	30.28	28.95	59.22	0.74%
Lamoure	0.00	25.83	25.83	0.32%
Logan	0.00	0.00	0.00	0.00%
McHenry	71.92	129.68	201.60	2.51%
McIntosh	19.70	0.00	19.70	0.25%
McKenzie	267.62	1297.35	1564.97	19.47%
McLean	102.61	0.00	102.61	1.28%
Mercer	41.09	69.49	110.58	1.38%
Morton	195.71	94.15	289.86	3.61%
Mountrail	85.87	361.00	446.87	5.56%
Nelson	0.00	63.20	63.20	0.79%
Oliver	0.00	30.10	30.10	0.37%
Pembina	34.07	236.57	270.64	3.37%
Pierce	25.35	62.29	87.64	1.09%
Ramsey	48.69	39.43	88.12	1.10%
Ransom	33.04	58.17	91.21	1.13%
Renville	29.19	18.72	47.91	0.60%
Richland	62.77	42.30	105.08	1.31%
Rolette	0.00	0.00	0.00	0.00%
Sargent	0.00	26.59	26.59	0.33%

County	Gas Transmission	Hazardous Liquid	Total Mileage	Percent
Sheridan	0.00	0.00	0.00	0.00%
Sioux	0.00	0.00	0.00	0.00%
Slope	24.59	2.22	26.81	0.33%
Stark	134.44	62.42	196.85	2.45%
Steele	0.00	35.05	35.05	0.44%
Stutsman	94.62	79.26	173.88	2.16%
Towner	0.00	0.00	0.00	0.00%
Traill	0.00	32.09	32.09	0.40%
Walsh	26.57	26.06	52.62	0.65%
Ward	127.58	175.45	303.04	3.77%
Wells	26.86	54.73	81.59	1.02%
Williams	139.17	971.93	1111.10	13.83%
Total	2587.23	5448.97	8036.21	1.00

Source: USDOT Pipeline and Hazardous Materials Safety Administration, 2023

E.15.6 State Pipeline Totals

North Dakota Total Mileage by System Type, 2022

System Type	Miles
Gas Distribution Main Miles	4,056
Gas Distribution Service Miles	3,155
Gas Gathering Miles	2,499
Gas Transmission Miles	2,639
Total Miles	**12,349**

Source: USDOT Pipeline and Hazardous Materials Safety Administration, 2023

North Dakota Liquid Facilities by Commodity, 2022

Commodity	Miles	Tanks
CO2	176	0
Crude Oil	3,645	185
HVL Flam Toxic	702	0
Refined PP	838	38
Total	5,362	223

Source: USDOT Pipeline and Hazardous Materials Safety Administration, 2023

E.15.7 Hazard Ranking by County

Plan	Ranking
Adams County	Moderate
Barnes County	High
Benson County	Low
Billings County[1]	Moderate
Bottineau County	Moderate
Bowman County[3]	Moderate
Burke County[4]	Very High
Burleigh County	Moderate
Cass County	Not Mentioned
Cavalier County	Not Mentioned
Dickey County	High
Divide County[4]	Very High
Dunn County[1]	Moderate
Eddy County[2]	Moderate
Emmons County	Moderate
Foster County	Low
Golden Valley County[1]	Moderate
Grand Forks County	Moderate
Grant County	Moderate
Griggs County	High
Hettinger County	Moderate
Kidder County	Moderate
LaMoure County	Moderate
Logan County	Moderate
McHenry County	Low
McIntosh County	Low
McKenzie County	Moderate
McLean County	Moderate
Mercer County	Low
Morton County	Moderate
Mountrail County	Moderate
Nelson County	Not Mentioned
Oliver County	Moderate
Pembina County	Moderate
Pierce County	Moderate
Ramsey County	Low
Ransom County	Moderate
Renville County	High
Richland County	High
Rolette County	Not Mentioned

Plan	Ranking
Sargent County	High
Sheridan County	Not Mentioned
Sioux County[5]	Moderate
Slope County[3]	Moderate
Spirit Lake Nation	Not Mentioned
Stark County[1]	Moderate
Standing Rock Sioux Tribe[5]	Moderate
Steele County	High
Stutsman County	High
Three Affiliated Tribes	Not Mentioned
Towner County	Low
Traill County	Low
Turtle Mountain	Moderate
Walsh County	Not Mentioned
Ward County	Not Mentioned
Wells County[2]	Moderate
Williams County	Not Mentioned
City of Bismarck	Moderate

Source: Cumulation of data extracted from local and tribal plans

Appendix F. 2020-2023 Progress Reports

F.1 2020 Progress Report -- FINAL_Hazard Mitigation Progress Report 2020.pdf (nd.gov)

F.2 2021 Progress Report -- Hazard Mitigation 2021_FINAL.pdf (nd.gov)

F.3 2022 Progress Report -- State Hazard Mitigation Report 2022_sm.pdf (nd.gov)

F.4 2023 Progress Report -- State Hazard Mitigation Report 2023.pdf (nd.gov)

G. Execution Appendix

G.1 Prioritization Methodology

STAPLEE: Social, Technical, Administrative, Political, Legal, Economic, and Environmental.	
Criteria	**Considerations**
Social	• Will the public support the mitigation action? • Will the community support the mitigation action? • How will the mitigation action effect different segments of the population (positively or negatively)?
Technical	• Is the mitigation action feasible? • Does the mitigation action propose a long-term solution? • Will the mitigation action reduce losses? • Will the mitigation action have minimal secondary impacts?
Administrative	• Does the jurisdiction have the staff to complete the mitigation action? • Does the jurisdiction have the funds to meet their local match for the mitigation action? • Does the jurisdiction have the capability/capacity to provide the necessary maintenance associated with the completed mitigation action?
Political	• Does the mitigation action have political support or opposition? • Does the mitigation action have a champion at the jurisdictional level to support throughout the duration of the project? • Does the mitigation action have representation to garner public support?
Legal	• Does the jurisdiction have the legal authority to implement the mitigation action? • Does the jurisdiction have to pass new laws or regulations prior to implementing the mitigation action?
Economic	• What is the Benefit-Cost Ratio of the mitigation action? • What are the current and future impacts of the mitigation action? • What is the return on investment of the mitigation action? • What is the jurisdiction's match requirement for the mitigation action?
Environmental	• What are the current and future impacts of the mitigation action on the environment? • Is the mitigation action compliant with statutory regulations and laws (NEPA)? • Is the mitigation action near any hazardous material sites or bodies of water?

G.2 Mitigation Action Prioritization Analysis

Mitigation Action	Social	Technical	Administrative	Political	Legal	Economic	Environmental
Streamline carbon capture permitting to incentivize industry to sequester greenhouse gas emissions so North Dakota achieves carbon neutrality by 2030		X			X	X	X
Evaluate and promote local jurisdictions to adopt landscape ordinances and water conservation ordinances to improve water quality and conserve natural resources					X		X
Enforce compliance with new dam design standards as part of the permitting process		X			X	X	X
Update hazard classification of existing dams to align with new classification policy		X	X	X	X	X	
Continue to implement Safety Corridors to decrease accidents in areas with a high history of accidents	X	X	X	X	X	X	X
Reduce unsignalized at grade crossings in the state by 20 per year	X	X	X	X	X	X	
Update all 13 currently outdated Community Wildfire Protection Plans	X	X		X	X		X
Engage partners to update data that is used by the environmental justice screening and assessment tool so the tool is more accurate and applicable		X	X				X

Mitigation Action	Social	Technical	Administrative	Political	Legal	Economic	Environmental
Provide technical and financial assistance to local and tribal jurisdictions developing or updating MHMPs and assist communities with other mitigation-planning related initiatives		X	X				
Identify and enact GIS improvements or data creation to leverage information as made available from external partners in the most efficient means possible for the end goals of desktop and web-based GIS products for analysis and common operational decision making		X	X				
In accordance with the NDGS long range geologic mapping plan, the NDGS will complete the detailed geologic mapping of the remaining 25 - 7.5' quadrangles that cover Cass County		X	X				
Promote the Firewise and Community Wildfire and Protection Program	X		X	X	X	X	X
Enact basin wide hydrologic studies to understand flood extent and to educate communities on risk; and to develop a strategy for potential mitigation activities	X	X		X		X	X
Review regulations/permit conditions for addressing secondary or tertiary effects of increased climate variability	X		X				X
Develop Repetitive Loss and Severe Repetitive Loss management strategy document		X	X			X	X

Mitigation Action	Social	Technical	Administrative	Political	Legal	Economic	Environmental
Evaluate and promote local and tribal jurisdictions to adopt regulatory setbacks or other alternatives to reduce the risk of property loss in high-hazard areas		X	X		X	X	X
Develop a digital toolbox with updated NDDES Drought Resource Guides to assist local and tribal partners with drought planning, management, and informational resources		X	X				
Develop siting guidance and education materials for critical infrastructure; with the goal of educating infrastructure developers to consider hazardous material release impacts	X		X				
Form a committee to study how mitigation projects enacted by SHMT partners have resulted in losses avoided		X	X		X	X	
Integrate mitigation plans with comprehensive plans, climate action plans, drought mitigation, and other resiliency initiatives (Note this was previously listed as: Promote integration of mitigation comprehensive plans)		X	X	X	X	X	
Foster greater participation of cultural and historical preservation organization in the planning process	X		X				X
Advocate federal partners to review and update data sources (flood maps) that are cited in federal regulations		X	X	X			

Mitigation Action	Social	Technical	Administrative	Political	Legal	Economic	Environmental
Develop or acquire systems to integrate climate impact data with surveillance data on new and emerging plant, animal, and human diseases		X	X	X	X	X	
Conduct outreach with local and tribal zoning and planning boards and commissions to encourage development of master and/or comprehensive plans		X	X	X	X	X	
Advance the adoption of building codes and zoning ordinances develop and update building codes and zoning ordinances through outreach with local and tribal zoning and planning boards and commissions		X	X			X	
Review EAPs to ensure these plans address actions to reduce the potential consequences of dam failure		X	X		X	X	
Promote electrical infrastructure resilience by expanding cybersecurity methods and installing back-up generators and other redundancies		X	X		X	X	
Rehabilitate aging dams that do not meet current dam safety criteria		X		X	X	X	X
Provide technical assistance to private dam owners to rehabilitate aging dams	X	X			X	X	X
Upgrade infrastructure to modernize and improve water quality and supply, and to reduce the affects from increased flooding and drought	X	X	X	X	X	X	X
Construct new or upgrade existing water delivery systems to improve efficiency and	X	X	X	X	X	X	X

Mitigation Action	Social	Technical	Administrative	Political	Legal	Economic	Environmental
conservation (such as breaks caused by ground shifting)							
Encourage redundancies within power systems by assisting subapplicants to develop applications under HMGP and BRIC			X			X	
Assist subapplicants with application development of flood proofing projects to protect critical facilities, utility infrastructure, government buildings, and residential structures			X			X	
Assist subapplicants with application development of tornado safe room and shelter projects			X	X		X	
Convert overhead powerlines to buried underground lines, where appropriate (Note this was previously listed as: Promote electrical infrastructure mitigation measures)	X		X	X		X	
Assist subapplicants with application development for generators and other redundancies for back-up power sources on critical facilities, water towers, and lift stations	X		X			X	
Improve transportation infrastructure to reduce accidents and prevent mass casualty and hazardous material release incidents	X	X		X		X	X
Assist subapplicants with application development for installation and update of outdoor warning systems	X		X	X			

Mitigation Action	Social	Technical	Administrative	Political	Legal	Economic	Environmental
Construct with permeable paved surfaces to reduce runoff and promote groundwater recharge (also known as water smart landscaping)				X			X
Work with communities to implement and enforce building codes when retrofitting buildings and critical facilities to withstand wind and weight, and proper water line depth		X				X	X
Explore and identify options for hastening river channel modification where change is imminent in the long-term		X	X	X		X	X
Evaluate structural and nonstructural mitigation alternatives for at-risk areas for landslides near waterways		X	X				X
Identify areas of cultural significance at risk from geological hazards	X		X				X
Collaborate with partners to restore rivers and streams most vulnerable to drought impacts to increase resiliency for water supply, streamflow, and aquatic habitats			X			X	X
Identify potential areas or communities that may be adversely affected by excessive fuel loading and create partnerships to mitigate wildfire fuel loads	X	X		X		X	X
Invest in natural buffers and nature- based solutions to improve water quality				X		X	X
Construct infiltration basins as an alternative mean of water storage		X		X		X	X

Mitigation Action	Social	Technical	Administrative	Political	Legal	Economic	Environmental
Support the development of natural and artificial snow fences at the local and tribal levels		X				X	X
Construct and incorporate raingardens or vegetated swales to reduce storm water runoff	X						X
Invest in community projects including planting and utilizing tree canopies to reduce urban heat-island effects	X	X				X	X
Create media literacy kits to educate the public about hazards and reduce the spread of misinformation	X		X				
Promote climate literacy kits, amongst other tailored youth and adult hazard information, available via partnership with the ND State Library	X		X	X			
Develop and conduct mitigation funding trainings to increase (1) awareness of programs and (2) capabilities of local and tribal communities to apply		X	X				
Disseminate state-developed risk information products to property homeowners, real estate agents, developers, tribes, and public officials so that individuals, tribes, and communities can make decisions about geological hazards			X				
Train NDDES Staff and Local and Tribal Mitigation Planners on use of Equity Mapping Tools		X	X				

Mitigation Action	Social	Technical	Administrative	Political	Legal	Economic	Environmental
Form coalition or workgroup of public/private sector utility experts and stakeholders in electricity generation/distribution industry to share resources and mitigation ideas			X				
Form coalition or workgroup of public/private sector utility experts and stakeholders in the pipeline industry to share resources and mitigation ideas			X				
Identify eligible dams for HHPD grant and apply to fund rehabilitation; and work with emergency managers and dam owners to pursue funding		X	X			X	
Conduct community flood insurance and flood hazard mitigation forums regarding available programs, resources, and funding sources	X		X	X		X	
Establish a clear public drought warning system that is easy to understand and emphasizes an ability to give early warnings via ND Mesonet System (NDAWN)	X		X				
Identify and/or develop and conduct a Whole Community education program that teaches the basics and benefits of gardening, pollinator gardens, native flowers and plants, and home-grown food systems	X		X			X	X
Host outreach activities encourage homeowners to purchase insurance (including flood insurance)	X		X				
Increase participation in the NOAA's National Weather Service's StormReady Program			X	X	X		

Mitigation Action	Social	Technical	Administrative	Political	Legal	Economic	Environmental
Provide physical and cyber security measures grant funding to schools and other public entities	X		X	X			
Create and promote public Air Quality notification and announcement capabilities and system	X		X				
Develop county- and state- and tribal-based landslide information tracking system of active and recent landslides to assist with land and water development decision-making		X	X				
Conduct outreach with elected officials, neighborhood groups, and homeowner associations about the benefits of maintaining defensible spaces	X		X	X		X	X
Support educational efforts related to culturally important native plants (tribal/medicinal), food, and animals that are impacted by drought	X		X				X
Conduct education and outreach on available programs and financial support to implement sustainable grazing and agricultural conservation practices	X		X				X
Provide education on how producers and the public can conduct water testing to ensure safe water quality conditions, especially the testing of nitrates in feed during deteriorating drought environmental conditions	X		X				X

Mitigation Action	Social	Technical	Administrative	Political	Legal	Economic	Environmental
Conduct outreach to increase NFIP participation, advance awareness/use of RiskMAP products, and increase CRS scores	X	X	X	X	X	X	X
Conduct outreach with the livestock industry to understand insurance options	X	X			X	X	
Promote storm safety information during Severe Weather Awareness Weeks	X		X				
Launch a public outreach program targeting both businesses and citizens related to advance indoor/outdoor water conservation practices	X		X			X	X
Promote public awareness and use of NDDOT resources, which includes travel maps, cameras, and an opt-in service that sends condition updates	X		X				
Develop web-based Disaster Recovery Planning resources that promotes community resiliency			X				
Maintain multi-agency response to human and animal disease threats			X				X
Create a winter weather information dashboard for a centralized location for decision making		X	X				
Establish and maintain a robust medical cache with ease of access to resources such as personal protective equipment to mitigate exposure to infectious and harmful agents		X	X	X			
Build capacity (rosters, training, equipment) at the local and tribal fire department levels to promote self-sufficiency and reliable Mutual Aid Responses when needed	X	X	X			X	

Mitigation Action	Social	Technical	Administrative	Political	Legal	Economic	Environmental
Build capacity in small communities that lack snow removal capabilities by increasing equipment inventories, regionalizing snow removal routes and resource sharing, and identifying additional funding to further boost self sufficiency		X	X			X	
Continue to identify Traffic Incident Management (TIM) opportunities and training			X				
Improve summary reporting ability from HazConnect database for local users and improved planning purposes		X	X				
Establish and promote Cyber Security best practice guidelines via Defend.Nd.gov			X				
Champion information security and cybersecurity to encourage citizens to increase awareness and knowledge of the issue	X		X				
Promote programs that draw awareness to the recognition and prevention of drug use, specifically fentanyl overdose and drug related deaths	X		X				
Build and enhance collaboration with Canadian and Tribal contacts to facilitate communication, surveillance, and tracking of infectious diseases in order to better inform mitigation measures			X				

Mitigation Action	Social	Technical	Administrative	Political	Legal	Economic	Environmental
Evaluate available resources and address resource gaps for healthcare systems and veterinarian services to develop plans and interagency partnerships to share resources necessary for prevention and mitigation measures			X			X	
Target two critical infrastructure assessment sectors and host two Critical Infrastructure presentations annually	X		X				
Facilitate the discussion and development of a behavioral analysis task force at the local and tribal levels that is supported by state agencies		X	X				
Invest in Intelligent Transportation Systems for Traffic Incident Mitigation which includes cameras, dynamic message systems, fixed anti-icing spray technology, intersection collision warning systems, curve warning systems, and wrong way detection systems			X	X		X	
Support development of local and tribal drought contingency plans with rural and regional water suppliers		X	X				X
Procure and install secure electronic systems		X	X	X	X		
Educate and support the Whole Community on ways to mitigate cyber threats affecting personal, private, and State security and other sensitive information	X		X				
Enact loss control measures to increase safety and health of workers, first responders, and New Americans		X	X			X	

Mitigation Action	Social	Technical	Administrative	Political	Legal	Economic	Environmental
Promote vaccinating and remove barriers (such as transportation access) for the at-risk population to induce active immunity to a disease and develop herd immunity or slow disease progression	X	X	X	X		X	
Promote training through the Center for Domestic Preparedness to include mobile field force and command, and protester devices trainings offered at local jurisdictions annually		X	X	X	X	X	
Educate homeowners on the benefits of climate smart lawns with drought tolerant native vegetation	X		X			X	X
Provide speed limit education and information for bulk transporters	X		X				
Assist the private business sector and local and tribal jurisdictions with Continuity of Operations (COOP) planning in preparation of adversarial threats or natural hazards		X	X				
Maintain tree trimming along power lines to prevent power outages		X	X			X	X
Provide technical information to health care professional, agronomists, vector control boards, and others regarding the prevention and control of diseases or infestations, including infection prevention		X	X				
Provide technical assistance to local and tribal jurisdictions with hazardous materials planning		X	X				

Mitigation Action	Social	Technical	Administrative	Political	Legal	Economic	Environmental
Promote and enforce safe handling, storage, and disposal of hazardous materials		X	X		X		
TOTALS	**44**	**56**	**87**	**33**	**25**	**50**	**40**
	Social	**Technical**	**Administrative**	**Political**	**Legal**	**Economic**	**Environmental**

G.3 Mitigation Actions Hazards Addressed

Mitigation Action	Adversarial Threats				Technological Hazards				Natural Hazards						
	Civil Disturbance	Criminal Attacks	Terrorist, or Nation-State Attacks	Cyber Attack	Dam Failure	Hazardous Materials Release	Space Weather	Transportation Incident	Drought	Flood	Geologic Hazards	Infectious Diseases	Severe Summer Weather	Severe Winter Weather	Wildfire/ Urban Fire
Streamline carbon capture permitting to incentivize industry to sequester greenhouse gas emissions so North Dakota achieves carbon neutrality by 2030						X									
Evaluate and promote local jurisdictions to adopt landscape ordinances and water conservation ordinances to improve water quality and conserve natural resources									X						
Enforce compliance with new dam design standards as part of the permitting process					X										
Update hazard classification of existing dams to align with new classification policy					X										
Continue to implement Safety Corridors to decrease accidents in areas with a high history of accidents						X		X			X			X	
Reduce unsignalized at grade crossings in the state by 20 per year						X		X							
Update all 13 currently outdated Community Wildfire Protection Plans															X

Mitigation Action	Adversarial Threats			Technological Hazards					Natural Hazards						
	Civil Disturbance	Criminal Attacks	Terrorist, or Nation-State Attacks	Cyber Attack	Dam Failure	Hazardous Materials Release	Space Weather	Transportation Incident	Drought	Flood	Geologic Hazards	Infectious Diseases	Severe Summer Weather	Severe Winter Weather	Wildfire/ Urban Fire
Engage partners to update data that is used by the environmental justice screening and assessment tool so the tool is more accurate and applicable	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Provide technical and financial assistance to local and tribal jurisdictions developing or updating MHMPs and assist communities with other mitigation-planning related initiatives	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Identify and enact GIS improvements or data creation to leverage information as made available from external partners in the most efficient means possible for the end goals of desktop and web-based GIS products for analysis and common operational decision making	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
In accordance with the NDGS long range geologic mapping plan, the NDGS will complete the detailed geologic mapping of the remaining 25 - 7.5' quadrangles that cover Cass County											X				

Mitigation Action	Adversarial Threats			Technological Hazards						Natural Hazards					
	Civil Disturbance	Criminal Attacks	Terrorist, or Nation-State Attacks	Cyber Attack	Dam Failure	Hazardous Materials Release	Space Weather	Transportation Incident	Drought	Flood	Geologic Hazards	Infectious Diseases	Severe Summer Weather	Severe Winter Weather	Wildfire/ Urban Fire
Promote the Firewise and Community Wildfire and Protection Program															X
Enact basin wide hydrologic studies to understand flood extent and to educate communities on risk; and to develop a strategy for potential mitigation activities										X					
Review regulations/permit conditions for addressing secondary or tertiary effects of increased climate variability						X									
Develop Repetitive Loss and Severe Repetitive Loss management strategy document										X					
Evaluate and promote local and tribal jurisdictions to adopt regulatory setbacks or other alternatives to reduce the risk of property loss in high-hazard areas										X	X				X
Develop a digital toolbox with updated NDDES Drought Resource Guides to assist local and tribal partners with drought planning, management, and informational resources									X						

Mitigation Action	Adversarial Threats				Technological Hazards						Natural Hazards				
	Civil Disturbance	Criminal Attacks	Terrorist, or Nation-State Attacks	Cyber Attack	Dam Failure	Hazardous Materials Release	Space Weather	Transportation Incident	Drought	Flood	Geologic Hazards	Infectious Diseases	Severe Summer Weather	Severe Winter Weather	Wildfire/ Urban Fire
Develop siting guidance and education materials for critical infrastructure; with the goal of educating infrastructure developers to consider hazardous material release impacts						X									
Form a committee to study how mitigation projects enacted by SHMT partners have resulted in losses avoided										X					
Integrate mitigation plans with comprehensive plans, climate action plans, drought mitigation, and other resiliency initiatives (Note this was previously listed as: Promote integration of mitigation comprehensive plans)	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Foster greater participation of cultural and historical preservation organization in the planning process	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Advocate federal partners to review and update data sources (flood maps) that are cited in federal regulations						X				X					

Mitigation Action	Adversarial Threats				Technological Hazards				Natural Hazards						
	Civil Disturbance	Criminal Attacks	Terrorist, or Nation-State Attacks	Cyber Attack	Dam Failure	Hazardous Materials Release	Space Weather	Transportation Incident	Drought	Flood	Geologic Hazards	Infectious Diseases	Severe Summer Weather	Severe Winter Weather	Wildfire/ Urban Fire
Develop or acquire systems to integrate climate impact data with surveillance data on new and emerging plant, animal, and human diseases												X			
Conduct outreach with local and tribal zoning and planning boards and commissions to encourage development of master and/or comprehensive plans	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Advance the adoption of building codes and zoning ordinances develop and update building codes and zoning ordinances through outreach with local and tribal zoning and planning boards and commissions					X				X	X			X	X	X
Review EAPs to ensure these plans address actions to reduce the potential consequences of dam failure					X										
Promote electrical infrastructure resilience by expanding cybersecurity methods and installing back-up generators and other redundancies				X											
Rehabilitate aging dams that do not meet					X										

Mitigation Action	Adversarial Threats				Technological Hazards				Natural Hazards						
	Civil Disturbance	Criminal Attacks	Terrorist, or Nation-State Attacks	Cyber Attack	Dam Failure	Hazardous Materials Release	Space Weather	Transportation Incident	Drought	Flood	Geologic Hazards	Infectious Diseases	Severe Summer Weather	Severe Winter Weather	Wildfire/ Urban Fire
current dam safety criteria															
Provide technical assistance to private dam owners to rehabilitate aging dams					X										
Upgrade infrastructure to modernize and improve water quality and supply, and to reduce the affects from increased flooding and drought									X	X					
Construct new or upgrade existing water delivery systems to improve efficiency and conservation (such as breaks caused by ground shifting)									X						
Encourage redundancies within power systems by assisting subapplicants to develop applications under HMGP and BRIC	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Assist subapplicants with application development of flood proofing projects to protect critical facilities, utility infrastructure, government buildings, and residential structures										X					
Assist subapplicants with application development of													X		

Mitigation Action	Adversarial Threats					Technological Hazards					Natural Hazards				
	Civil Disturbance	Criminal Attacks	Terrorist, or Nation-State Attacks	Cyber Attack	Dam Failure	Hazardous Materials Release	Space Weather	Transportation Incident	Drought	Flood	Geologic Hazards	Infectious Diseases	Severe Summer Weather	Severe Winter Weather	Wildfire/ Urban Fire
tornado safe room and shelter projects															
Convert overhead powerlines to buried underground lines, where appropriate (Note this was previously listed as: Promote electrical infrastructure mitigation measures)							X						X	X	
Assist subapplicants with application development for generators and other redundancies for back-up power sources on critical facilities, water towers, and lift stations													X	X	
Improve transportation infrastructure to reduce accidents and prevent mass casualty and hazardous material release incidents						X		X						X	
Assist subapplicants with application development for installation and update of outdoor warning systems													X		
Construct with permeable paved surfaces to reduce runoff and promote groundwater recharge (also known as water smart landscaping)									X						

Mitigation Action	Adversarial Threats			Technological Hazards					Natural Hazards						
	Civil Disturbance	Criminal Attacks	Terrorist, or Nation-State Attacks	Cyber Attack	Dam Failure	Hazardous Materials Release	Space Weather	Transportation Incident	Drought	Flood	Geologic Hazards	Infectious Diseases	Severe Summer Weather	Severe Winter Weather	Wildfire/ Urban Fire
Work with communities to implement and enforce building codes when retrofitting buildings and critical facilities to withstand wind and weight, and proper water line depth													X	X	
Explore and identify options for hastening river channel modification where change is imminent in the long-term										X	X				
Evaluate structural and nonstructural mitigation alternatives for at-risk areas for landslides near waterways											X				
Identify areas of cultural significance at risk from geological hazards											X				
Collaborate with partners to restore rivers and streams most vulnerable to drought impacts to increase resiliency for water supply, streamflow, and aquatic habitats									X						
Identify potential areas or communities that may be adversely affected by excessive fuel loading and create partnerships to															X

Mitigation Action	Adversarial Threats				Technological Hazards				Natural Hazards						
	Civil Disturbance	Criminal Attacks	Terrorist, or Nation-State Attacks	Cyber Attack	Dam Failure	Hazardous Materials Release	Space Weather	Transportation Incident	Drought	Flood	Geologic Hazards	Infectious Diseases	Severe Summer Weather	Severe Winter Weather	Wildfire/ Urban Fire
mitigate wildfire fuel loads															
Invest in natural buffers and nature-based solutions to improve water quality									X						
Construct infiltration basins as an alternative mean of water storage									X						
Support the development of natural and artificial snow fences at the local and tribal levels														X	
Construct and incorporate raingardens or vegetated swales to reduce storm water runoff													X		
Invest in community projects including planting and utilizing tree canopies to reduce urban heat-island effects													X		
Create media literacy kits to educate the public about hazards and reduce the spread of misinformation	X	X	X	X											
Promote climate literacy kits, amongst other tailored youth and adult hazard information, available via partnership with the ND State Library									X	X	X	X	X	X	X

Mitigation Action	Adversarial Threats			Technological Hazards							Natural Hazards				
	Civil Disturbance	Criminal Attacks	Terrorist, or Nation-State Attacks	Cyber Attack	Dam Failure	Hazardous Materials Release	Space Weather	Transportation Incident	Drought	Flood	Geologic Hazards	Infectious Diseases	Severe Summer Weather	Severe Winter Weather	Wildfire/ Urban Fire
Develop and conduct mitigation funding trainings to increase (1) awareness of programs and (2) capabilities of local and tribal communities to apply	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Disseminate state-developed risk information products to property homeowners, real estate agents, developers, tribes, and public officials so that individuals, tribes, and communities can make decisions about geological hazards											X				
Train NDDES Staff and Local and Tribal Mitigation Planners on use of Equity Mapping Tools	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Form coalition or workgroup of public/private sector utility experts and stakeholders in electricity generation/distributio n industry to share resources and mitigation ideas				X			X						X	X	
Form coalition or workgroup of public/private sector utility experts and stakeholders in the pipeline industry to				X			X						X	X	

Mitigation Action	Adversarial Threats				Technological Hazards				Natural Hazards						
	Civil Disturbance	Criminal Attacks	Terrorist, or Nation-State Attacks	Cyber Attack	Dam Failure	Hazardous Materials Release	Space Weather	Transportation Incident	Drought	Flood	Geologic Hazards	Infectious Diseases	Severe Summer Weather	Severe Winter Weather	Wildfire/ Urban Fire
share resources and mitigation ideas															
Identify eligible dams for HHPD grant and apply to fund rehabilitation; and work with emergency managers and dam owners to pursue funding					X										
Conduct community flood insurance and flood hazard mitigation forums regarding available programs, resources, and funding sources										X					
Establish a clear public drought warning system that is easy to understand and emphasizes an ability to give early warnings via ND Mesonet System (NDAWN)									X						
Identify and/or develop and conduct a Whole Community education program that teaches the basics and benefits of gardening, pollinator gardens, native flowers and plants, and home-grown food systems									X						
Host outreach activities encourage homeowners to purchase insurance										X			X		X

Mitigation Action	Adversarial Threats				Technological Hazards				Natural Hazards						
	Civil Disturbance	Criminal Attacks	Terrorist, or Nation-State Attacks	Cyber Attack	Dam Failure	Hazardous Materials Release	Space Weather	Transportation Incident	Drought	Flood	Geologic Hazards	Infectious Diseases	Severe Summer Weather	Severe Winter Weather	Wildfire/ Urban Fire
(including flood insurance)															
Increase participation in the NOAA's National Weather Service's StormReady Program													X		
Provide physical and cyber security measures grant funding to schools and other public entities	X	X	X	X											
Create and promote public Air Quality notification and announcement capabilities and system						X									X
Develop county- and state- and tribal-based landslide information tracking system of active and recent landslides to assist with land and water development decision-making											X				
Conduct outreach with elected officials, neighborhood groups, and homeowner associations about the benefits of maintaining defensible spaces															X
Support educational efforts related to culturally important native plants (tribal/medicinal), food, and animals that									X						

Mitigation Action	Adversarial Threats			Technological Hazards					Natural Hazards						
	Civil Disturbance	Criminal Attacks	Terrorist, or Nation-State Attacks	Cyber Attack	Dam Failure	Hazardous Materials Release	Space Weather	Transportation Incident	Drought	Flood	Geologic Hazards	Infectious Diseases	Severe Summer Weather	Severe Winter Weather	Wildfire/ Urban Fire
are impacted by drought															
Conduct education and outreach on available programs and financial support to implement sustainable grazing and agricultural conservation practices									X						
Provide education on how producers and the public can conduct water testing to ensure safe water quality conditions, especially the testing of nitrates in feed during deteriorating drought environmental conditions									X						
Conduct outreach to increase NFIP participation, advance awareness/use of RiskMAP products, and increase CRS scores										X					
Conduct outreach with the livestock industry to understand insurance options									X						
Promote storm safety information during Severe Weather Awareness Weeks													X	X	
Launch a public outreach program targeting both businesses and citizens									X						

Mitigation Action	Adversarial Threats			Technological Hazards					Natural Hazards						
	Civil Disturbance	Criminal Attacks	Terrorist, or Nation-State Attacks	Cyber Attack	Dam Failure	Hazardous Materials Release	Space Weather	Transportation Incident	Drought	Flood	Geologic Hazards	Infectious Diseases	Severe Summer Weather	Severe Winter Weather	Wildfire/ Urban Fire
related to advance indoor/outdoor water conservation practices															
Promote public awareness and use of NDDOT resources, which includes travel maps, cameras, and an opt-in service that sends condition updates								X						X	
Develop web-based Disaster Recovery Planning resources that promotes community resiliency	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Maintain multi-agency response to human and animal disease threats												X			
Create a winter weather information dashboard for a centralized location for decision making														X	
Establish and maintain a robust medical cache with ease of access to resources such as personal protective equipment to mitigate exposure to infectious and harmful agents												X			
Build capacity (rosters, training, equipment) at the local and tribal fire department levels to promote self-sufficiency and reliable Mutual Aid Responses when needed															X

Mitigation Action	Adversarial Threats				Technological Hazards				Natural Hazards						
	Civil Disturbance	Criminal Attacks	Terrorist, or Nation-State Attacks	Cyber Attack	Dam Failure	Hazardous Materials Release	Space Weather	Transportation Incident	Drought	Flood	Geologic Hazards	Infectious Diseases	Severe Summer Weather	Severe Winter Weather	Wildfire/ Urban Fire
Build capacity in small communities that lack snow removal capabilities by increasing equipment inventories, regionalizing snow removal routes and resource sharing, and identifying additional funding to further boost self sufficiency														X	
Continue to identify Traffic Incident Management (TIM) opportunities and training								X							
Improve summary reporting ability from HazConnect database for local users and improved planning purposes						X									
Establish and promote Cyber Security best practice guidelines via Defend.Nd.gov				X											
Champion information security and cybersecurity to encourage citizens to increase awareness and knowledge of the issue				X											
Promote programs that draw awareness to the recognition and prevention of drug use, specifically fentanyl overdose and drug related deaths		X													

Mitigation Action	Adversarial Threats			Technological Hazards							Natural Hazards				
	Civil Disturbance	Criminal Attacks	Terrorist, or Nation-State Attacks	Cyber Attack	Dam Failure	Hazardous Materials Release	Space Weather	Transportation Incident	Drought	Flood	Geologic Hazards	Infectious Diseases	Severe Summer Weather	Severe Winter Weather	Wildfire/ Urban Fire
Build and enhance collaboration with Canadian and Tribal contacts to facilitate communication, surveillance, and tracking of infectious diseases in order to better inform mitigation measures												X			
Evaluate available resources and address resource gaps for healthcare systems and veterinarian services to develop plans and interagency partnerships to share resources necessary for prevention and mitigation measures												X			
Target two critical infrastructure assessment sectors and host two Critical Infrastructure presentations annually		X													
Facilitate the discussion and development of a behavioral analysis task force at the local and tribal levels that is supported by state agencies			X												
Invest in Intelligent Transportation Systems for Traffic Incident Mitigation which includes cameras, dynamic message systems,						X									

Mitigation Action	Adversarial Threats			Technological Hazards					Natural Hazards						
	Civil Disturbance	Criminal Attacks	Terrorist, or Nation-State Attacks	Cyber Attack	Dam Failure	Hazardous Materials Release	Space Weather	Transportation Incident	Drought	Flood	Geologic Hazards	Infectious Diseases	Severe Summer Weather	Severe Winter Weather	Wildfire/ Urban Fire
fixed anti-icing spray technology, intersection collision warning systems, curve warning systems, and wrong way detection systems															
Support development of local and tribal drought contingency plans with rural and regional water suppliers									X						
Procure and install secure electronic systems	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Educate and support the Whole Community on ways to mitigate cyber threats affecting personal, private, and State security and other sensitive information				X											
Enact loss control measures to increase safety and health of workers, first responders, and New Americans	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Promote vaccinating and remove barriers (such as transportation access) for the at-risk population to induce active immunity to a disease and develop herd immunity or slow disease progression												X			

Mitigation Action	Adversarial Threats			Technological Hazards							Natural Hazards				
	Civil Disturbance	Criminal Attacks	Terrorist, or Nation-State Attacks	Cyber Attack	Dam Failure	Hazardous Materials Release	Space Weather	Transportation Incident	Drought	Flood	Geologic Hazards	Infectious Diseases	Severe Summer Weather	Severe Winter Weather	Wildfire/ Urban Fire
Promote training through the Center for Domestic Preparedness to include mobile field force and command, and protester devices trainings offered at local jurisdictions annually	X														
Educate homeowners on the benefits of climate smart lawns with drought tolerant native vegetation									X						
Provide speed limit education and information for bulk transporters						X									
Assist the private business sector and local and tribal jurisdictions with Continuity of Operations (COOP) planning in preparation of adversarial threats or natural hazards	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Maintain tree trimming along power lines to prevent power outages													X	X	X
Provide technical information to health care professional, agronomists, vector control boards, and others regarding the prevention and control of diseases or												X			

Mitigation Action	Adversarial Threats			Technological Hazards						Natural Hazards					
	Civil Disturbance	Criminal Attacks	Terrorist, or Nation-State Attacks	Cyber Attack	Dam Failure	Hazardous Materials Release	Space Weather	Transportation Incident	Drought	Flood	Geologic Hazards	Infectious Diseases	Severe Summer Weather	Severe Winter Weather	Wildfire/ Urban Fire
infestations, including infection prevention															
Provide technical assistance to local and tribal jurisdictions with hazardous materials planning						X									
Promote and enforce safe handling, storage, and disposal of hazardous materials						X									
TOTALS	**16**	**17**	**16**	**21**	**20**	**26**	**16**	**18**	**32**	**26**	**22**	**21**	**28**	**28**	**24**
	Civil Disturbance	Criminal Attacks	Terrorist, or Nation-State Attacks	Cyber Attack	Dam Failure	Hazardous Materials Release	Space Weather	Transportation Incident	Drought	Flood	Geologic Hazards	Infectious Diseases	Severe Summer Weather	Severe Winter Weather	Wildfire/Urban Fire

G.4 Mitigation Action Types

Mitigation Group	Mitigation Actions
Planning and Regulatory Mitigation Actions	26
Structural and Infrastructure Mitigation Actions	16
Nature Based Mitigation	8
Public Education, Technical Assistance, and Partnerships	26
Other Mission Areas	27

H. Local and Tribal Plans

H.1 Program Administration by State

The Program Administration by State documentation is included as an Attachment to this Plan.

H.2 Local and Tribal Plan Status

Plan	Year Plan Used in MAOP	Submitting Update by April 2023	Expired, but Updating
Adams County	2019		
Barnes County	2021		
Benson County	2018	X	
Billings-Dunn-Golden Valley-Stark Counties	2020		
Bottineau County	2015		X
Bowman-Slope Counties	2018		
Burke-Divide Counties	2019		
Burleigh County	2020		
Cass County	2019		
Cavalier County	2023	X	
Dickey County	2019		
Eddy-Wells	2023 draft		X
Emmons County	2020		
Foster County	2021		
Grand Forks County	2020		
Grant County	2022		
Griggs County	2022	X	
Hettinger County	2019		
Kidder County	2021		
LaMoure County	2020		
Logan County	2022		
McHenry County	2018		
McIntosh County	2023	X	
McKenzie County	2020		
McLean County	2022		
Mercer County	2022		
Morton County	2020		
Mountrail County	2022		
Nelson County	2021		
Oliver County	2021		
Pembina County	2021		
Pierce County	2018		
Ramsey County	2016		X
Ransom County	2021		
Renville County	2017		X
Richland County	2022		
Rolette County	2019		
Sargent County	2021		

Sheridan County	2017		
Sioux County/Standing Rock Sioux Tribe	2016		
Spirit Lake Nation	2019		
Steele County	2017		X
Stutsman County	2021		
Three Affiliated Tribes	2018		
Towner County	2022		
Traill County	2017		X
Turtle Mountain	2023	X	
Walsh County	2021		
Ward County	2018		X
Williams County	2017		X
City of Bismarck	2021		

H.3 Local Capability Table

Capability Table – All jurisdictions are at the County Level unless otherwise noted in the name.

HMP = Hazard Mitigation Plan

NFIP = National Flood Insurance Program Participant

CRS = Community Rating System

SR= Storm Ready

CE= Code Enforcement

Jurisdiction	HMP	NFIP	CRS	SR	CE
Adams	Y	Y	N	Y	Y
Barnes	Y	Y	N	Y	N
Benson	Y	Y	N	Y	N
Billings	Y	Y	N	Y	Y
Bottineau	Y	N	N	Y	N
Bowman	Y	Y	N	Y	N
Burke	Y	N	N	Y	N
Burleigh	Y	Y	N	Y	Y
Cass	Y	Y	N	Y	N
Cavalier	Y	Y	N	Y	N
City of Bismarck	Y	Y	Y	Y	N
Dickey	Y	Y	N	Y	N
Divide	Y	N	N	Y	N
Dunn	Y	Y	N	Y	Y
Eddy	Y	Y	N	Y	N
Emmons	Y	Y	N	Y	N
Foster	Y	Y	N	Y	N
Golden Valley	Y	Y	N	Y	N
Grand Forks	Y	Y	N	Y	Y
Grant	Y	Y	N	Y	N
Griggs	Y	Y	N	Y	N
Hettinger	Y	Y	N	Y	Y
Kidder	Y	N	N	Y	N
LaMoure	Y	Y	N	Y	N
Logan	Y	Y	N	Y	N
McHenry	Y	Y	N	Y	N
McIntosh	Y	Y	N	Y	N
McKenzie	Y	N	N	Y	Y
McLean	Y	Y	N	Y	N
Mercer	Y	Y	N	Y	N
Morton	Y	Y	N	Y	Y

Jurisdiction	HMP	NFIP	CRS	SR	CE
Mountrail	Y	N	N	Y	Y
Nelson	Y	Y	N	Y	N
Oliver	Y	Y	N	Y	N
Pembina	Y	Y	N	Y	N
Pierce	Y	Y	N	Y	N
Ramsey	Y	Y	N	Y	N
Ransom	Y	Y	N	Y	N
Renville	Y	Y	N	Y	N
Richland	Y	Y	N	N	N
Rolette	Y	Y	N	Y	N
Sargent	Y	Y	N	Y	N
Sheridan	Y	N	N	Y	N
Sioux and Standing Rock (County and Tribe)	Y	Y	N	Y	N
Slope	Y	Y	N	Y	N
Spirit Lake Tribal Reservation	Y	Y	N	N	N
Stark	Y	Y	N	Y	Y
Steele	Y	Y	N	Y	N
Stutsman	Y	Y	N	Y	N
Three Affiliated Tribes Tribal Reservation	Y	Y	N	N	N
Towner	Y	Y	N	Y	N
Traill	Y	Y	N	Y	N
Turtle Mountain Tribal Reservation	Y	N	N	N	N
Walsh	Y	Y	N	Y	N
Ward	Y	Y	Y	Y	Y
Wells	Y	Y	N	Y	N
Williams	Y	Y	N	Y	N

H.4 Local Mitigation Actions

Mitigation Action	Adams	Barnes	Benson	Billings-Dunn-Golden Valley-Stark	Bottineau	Bowman-Slope	Burke-Divide	Burleigh	Cass	Cavalier
NFIP Crop Insurance Promotion	Medium			Medium		High	High	Low		High
NFIP Training	Low	Medium				High				
NFIP Participation	Low	Very High		Medium	High		High	Medium		High
Flood Studies/ Mapping Projects		High			High	High	High	High		Medium
Levee/Dam/Wall Projects						High			High	High
Enroll in CRS		High						Medium	Medium	
Elevate Roads/Bridges, Increase Culvert Sizes	Low	Very High	High	High	High		High	High	High	Medium
Monitor Dams/Levees		Very High								
Channel/Drain program/project		High			High		High	Medium	Medium	High
Bank Stabilization			High					High		High
Nonstructural Residential									Medium	Low
Detention Ponds					High				Medium	
Mitigate Lagoon Sewer			Medium		High					
Crit. Facility Emergency Generators	High	Very High	High	High	High	High	High	High		High
Protect/Upgrade Crit. Facilities		Very High	Medium		High	High		High	Medium	Medium
Public Education	High	High		High	High	High		Medium	Low	High
NOAA Radios										Medium
Firewise Program	High			Medium		High	High	Medium	Low	High
Snow Fences	Low			Low	High			Medium		Low

Mitigation Action	Adams	Barnes	Benson	Billings-Dunn-Golden Valley-Stark	Bottineau	Bowman-Slope	Burke-Divide	Burleigh	Cass	Cavalier
Bury/Upgrade Electric Lines	Medium		Low	Low		High				High
Improve EM Communications	High			Medium		High	High	High		
Saferooms/Shelters	Medium	High	High	High	High		High			
Upgrade EM/Services Equipment		High		High	High		High	High		
Burn Bans			Medium	Medium	High			Medium		
Hazardous Fuels Reduction			High		High		High	Low		Medium
Improve Security/Safety at Crit. Facilities		Very High	High		High		High	High		
Fire/HazMat Training	High		Medium	High	High					
Upgrade Signage	Medium	High	Medium			High	High	Medium		
Install Fire Index Signs		High			High			Medium		
Upgrade Emergency Sirens		High	High		High	High				Low
USDA Farm Service and NDSU Extension	Medium			Medium						
Adopt State Building Code	Low	Very High	Low				High			
Blight Reduction			High		High					Medium
Study Codes Building/Zoning/Flood		High						Medium		
Limit/Move Development from Hazard	High	High		Medium	High	High			High	
Identify Geologic Hazard	Low	High						Medium		
Space Weather Planning	Low			High						

Mitigation Action	Adams	Barnes	Benson	Billings-Dunn-Golden Valley-Stark	Bottineau	Bowman-Slope	Burke-Divide	Burleigh	Cass	Cavalier
Livestock/Bovine Planning	Medium	High								
HazMat Planning	Medium				High					
Vaccination Outreach Plan		High		High				Medium		
Vulnerability Plan		High						Medium		
Debris Management Plan		High			High	High				
Emergency Supply Plan				Medium						
Community Wildfire Protection Plan		High						Low		
Sheltering Plan	Medium	High		High			High	Medium		
Drainage Studies					High					Medium
Dam Emergency Plans							High	Low		
Drought Water Source Planning	Low						High		High	
Emergency Planning								High		Medium
Mass Casualty Planning									Medium	
Harden to Space Weather	Low	Medium	Low	High						
Data Backups				High						
Add River Gages					High					
Access Roads									High	
Vaccination Clinics								Medium		
Disease Surveillance								Medium		
Disease Monitoring								Medium		
Public Health Actions										
Mosquito Control							High			
Fire Activities					High			Low		
Cyber Countermeasures		High								High

Mitigation Action	Adams	Barnes	Benson	Billings-Dunn-Golden Valley-Stark	Bottineau	Bowman-Slope	Burke-Divide	Burleigh	Cass	Cavalier
Homeland Security Activities			Medium	High			High	Medium		
HazMat Activities					High					
Tornado Drills					High					
Expand Storm Spotters/StormReady					High			Medium		High
Contractor Licensing Program		High								
Financial Mitigation Capabilities		Very High								High
Water/Soil Conservation					High		High	Medium		
Repair Slumping Roads							High		Medium	

Mitigation Action	Dickey	Eddy-Wells	Emmons	Foster	Grand Forks	Grant	Griggs	Hettinger	Kidder	LaMoure
NFIP Crop Insurance Promotion	Medium	High		High	High		Medium	High	Medium	Medium
NFIP Training					High			High	High	Medium
NFIP Participation	Medium	High	Medium	Very High	High	Very High	High		Very High	
Flood Studies/ Mapping Projects	High	High	High	Very High	High	Very High		High	High	High
Levee/Dam/Wall Projects				Very High	High					
Enroll in CRS		High		High		Medium		Medium	High	
Elevate Roads/Bridges, Increase Culvert Sizes		Medium		High	High	Very High	High	Very High	Very High	High
Monitor Dams/Levees		High	Medium	Very High		Very High		Very High		

Mitigation Action	Dickey	Eddy-Wells	Emmons	Foster	Grand Forks	Grant	Griggs	Hettinger	Kidder	LaMoure
Channel/Drain program/project		High	Medium	High	High	Very High		High	High	High
Bank Stabilization			Low							
Nonstructural Residential										
Detention Ponds										
Mitigate Lagoon Sewer			High		High					
Crit. Facility Emergency Generators	High	High	High	High	High	High	High	High	Very High	High
Protect/Upgrade Crit. Facilities	Medium			Very High	Medium	Medium			Medium	Medium
Public Education	Medium	High	Medium	Very High	High	Very High	High	High	High	Medium
NOAA Radios			Medium	Medium		High				
Firewise Program	Medium	High	Low		High	High				Low
Snow Fences			Medium		Low	Low		Medium		
Bury/Upgrade Electric Lines	Medium				High					High
Improve EM Communications		High		High		High	High		High	High
Saferooms/Shelters	High	High		Medium	High	Medium		High	High	Medium
Upgrade EM/Services Equipment	High	High		High		High		High	Very High	High
Burn Bans			Medium	High						
Hazardous Fuels Reduction		High	Low			Medium				
Improve Security/Safety at Crit. Facilities				Very High		Very High				
Fire/HazMat Training				High	High					Low
Upgrade Signage		High				High		High	High	Low
Install Fire Index Signs		High		High		High		High	High	

Mitigation Action	Dickey	Eddy-Wells	Emmons	Foster	Grand Forks	Grant	Griggs	Hettinger	Kidder	LaMoure
Upgrade Emergency Sirens		High		High		High	High	High	High	High
USDA Farm Service and NDSU Extension										Low
Adopt State Building Code		High								
Blight Reduction		Medium								Low
Study Codes Building/Zoning/Flood	Medium	High	Medium	High	High	High	Medium	High	High	High
Limit/Move Development from Hazard	High				High		High	High		High
Identify Geologic Hazard										
Space Weather Planning										Low
Livestock/Bovine Planning				High		High		High	High	Low
HazMat Planning					Medium	High				Low
Vaccination Outreach Plan				High		High			Medium	
Vulnerability Plan			Medium							
Debris Management Plan		Medium		Medium		Medium	Low	Very High	Medium	
Emergency Supply Plan						Medium	Medium	Medium	Medium	Medium
Community Wildfire Protection Plan				High		High				
Sheltering Plan										High
Drainage Studies	Medium		Medium		High	High			High	Medium
Dam Emergency Plans			Low							High
Drought Water Source Planning		High			Low	Very High				Medium
Emergency Planning		Medium				Very High			Very High	
Mass Casualty Planning			Medium							
Harden to Space Weather				High		High		High	High	Medium
Data Backups										Low

Mitigation Action	Dickey	Eddy-Wells	Emmons	Foster	Grand Forks	Grant	Griggs	Hettinger	Kidder	LaMoure
Add River Gages										
Access Roads	High		Low							High
Vaccination Clinics			Medium							
Disease Surveillance			Medium							
Disease Monitoring			Medium							
Public Health Actions			Medium	High		High				
Mosquito Control		High								Medium
Fire Activities										
Cyber Countermeasures				High		High			High	
Homeland Security Activities										Medium
HazMat Activities				High		High				
Tornado Drills										
Expand Storm Spotters/StormReady		High								
Contractor Licensing Program										
Financial Mitigation Capabilities		Medium		Very High		Very High	Low	Very High	Very High	
Water/Soil Conservation			Medium	Medium	Medium	Medium		Medium	Medium	
Repair Slumping Roads					High					

Mitigation Action	Logan	McHenry	McIntosh	McKenzie	McLean	Mercer	Morton	Mountrail	Nelson	Oliver
NFIP Crop Insurance Promotion		High		Low		High		Medium		
NFIP Training	High				High	Medium	High			Medium
NFIP Participation	Very High		High			Medium	High		Medium	

Mitigation Action	Logan	McHenry	McIntosh	McKenzie	McLean	Mercer	Morton	Mountrail	Nelson	Oliver
Flood Studies/ Mapping Projects	Very High	Medium		Medium	Medium		High	Low		High
Levee/Dam/Wall Projects		Medium		High		Medium	Medium			
Enroll in CRS	High					Low	High		Medium	
Elevate Roads/Bridges, Increase Culvert Sizes	Very High	Low	Medium		High	Medium	Very High	Low	High	High
Monitor Dams/Levees	Very High		Low				Very High			Medium
Channel/Drain program/project	High	Medium			Medium	Medium			High	Medium
Bank Stabilization						High			Medium	
Nonstructural Residential										
Detention Ponds		Medium								
Mitigate Lagoon Sewer		Low							Medium	
Crit. Facility Emergency Generators	High	Medium	High	High	Medium	High	High	Medium	High	High
Protect/Upgrade Crit. Facilities		Low	Medium	Medium	Medium	Medium			High	High
Public Education	Very High	High	High	High	High	Low	High	Medium	Medium	High
NOAA Radios	High							Low		
Firewise Program		Medium			Medium	Low				Medium
Snow Fences	Low	Medium		Low					Medium	
Bury/Upgrade Electric Lines								Low	Medium	
Improve EM Communications	High		High	High	High		High	High	Medium	
Saferooms/Shelters	Medium	Medium			Medium	Medium		High	High	High

Mitigation Action	Logan	McHenry	McIntosh	McKenzie	McLean	Mercer	Morton	Mountrail	Nelson	Oliver
Upgrade EM/Services Equipment	High	Medium	Medium	Medium	Medium		High		Medium	High
Burn Bans	High		High	Medium				High		
Hazardous Fuels Reduction		High			Low			Medium		
Improve Security/Safety at Crit. Facilities	Very High			Medium						
Fire/HazMat Training		High		Medium	Medium			High	Medium	Medium
Upgrade Signage	High	Medium			Medium			High	Medium	High
Install Fire Index Signs	High						High			
Upgrade Emergency Sirens	High		High	Low	High	High	High	Medium		High
USDA Farm Service and NDSU Extension				Medium				High		
Adopt State Building Code		High			Medium				Medium	
Blight Reduction		High		Low						
Study Codes Building/Zoning/Flood	High	Medium		Medium	Medium		High	Medium	Medium	
Limit/Move Development from Hazard		Medium			Medium			High		
Identify Geologic Hazard							High	High		
Space Weather Planning				Low				High		
Livestock/Bovine Planning	High						High			
HazMat Planning			Low			Medium				
Vaccination Outreach Plan	High						Medium	Medium	Medium	
Vulnerability Plan		High		High	Medium			Medium		

Mitigation Action	Logan	McHenry	McIntosh	McKenzie	McLean	Mercer	Morton	Mountrail	Nelson	Oliver
Debris Management Plan	Medium						Medium			
Emergency Supply Plan	Medium					Medium	Medium			
Community Wildfire Protection Plan	High						High			
Sheltering Plan		Medium						High	Medium	
Drainage Studies										
Dam Emergency Plans				Medium			Medium	Medium		Medium
Drought Water Source Planning	Very High	Medium			High			Medium	Medium	
Emergency Planning	Very High	Medium	Medium	Medium			Very High			Medium
Mass Casualty Planning										
Harden to Space Weather	High		Medium		Low		High			
Data Backups	Very High									
Add River Gages										
Access Roads										
Vaccination Clinics										
Disease Surveillance										
Disease Monitoring										
Public Health Actions	High							Medium		Medium
Mosquito Control		Medium	Medium		Medium					
Fire Activities										
Cyber Countermeasures	High			Medium			High			
Homeland Security Activities			Medium	High						Medium
HazMat Activities	High				High		High	Low		
Tornado Drills										

Mitigation Action	Logan	McHenry	McIntosh	McKenzie	McLean	Mercer	Morton	Mountrail	Nelson	Oliver
Expand Storm Spotters/StormReady				High				Low		
Contractor Licensing Program										
Financial Mitigation Capabilities	Very High						Very High			
Water/Soil Conservation	Medium	High					Medium			
Repair Slumping Roads		Medium								

Mitigation Action	Pembina	Pierce	Ramsey	Ransom	Renville	Richland	Rolette	Sargent	Sheridan	Sioux County/ Standing Rock Sioux
NFIP Crop Insurance Promotion							High		Low	High
NFIP Training		High						High	High	High
NFIP Participation		High		Low				Medium	High	
Flood Studies/ Mapping Projects	High	High	Medium	Medium	Medium		Medium	Medium	High	Medium
Levee/Dam/Wall Projects	High		Medium	High		Medium		Low		
Enroll in CRS		Medium		Medium					Medium	High
Elevate Roads/Bridges, Increase Culvert Sizes	High	High	High	High	Medium	Medium	Medium	Medium	High	High
Monitor Dams/Levees		High			Medium	Medium	Medium			High
Channel/Drain program/project	High	High	Medium		Medium	Medium		Medium	High	High
Bank Stabilization			Medium	Medium	Medium					
Nonstructural Residential	High		Low			Medium				
Detention Ponds										

Mitigation Action	Pembina	Pierce	Ramsey	Ransom	Renville	Richland	Rolette	Sargent	Sheridan	Sioux County/ Standing Rock Sioux
Mitigate Lagoon Sewer	High		High	High	Medium				High	High
Crit. Facility Emergency Generators	High	High	High		Medium	Medium	Medium	Medium	Medium	High
Protect/Upgrade Crit. Facilities	High		High	High	Medium	Medium	Medium	Low	High	Medium
Public Education	High	High	High	High	Medium	Medium	Medium	Medium	High	High
NOAA Radios		Medium	High						Medium	
Firewise Program					Medium	Medium	Medium		High	High
Snow Fences	High	Medium	Low	Low	Medium	Medium	Medium	Low		Medium
Bury/Upgrade Electric Lines			Low						Medium	Low
Improve EM Communications		High		High	Medium	Medium	Medium	Low	Medium	High
Saferooms/Shelters	Medium	High	Medium					High		Medium
Upgrade EM/Services Equipment	High	High	Medium		Medium	Medium	Medium	Low	High	
Burn Bans							Medium			
Hazardous Fuels Reduction			Medium	Medium		Medium	Medium		Medium	High
Improve Security/Safety at Crit. Facilities			Low	Medium	Medium		Medium	Medium		
Fire/HazMat Training				Low		Medium	Medium	Medium		
Upgrade Signage		High	High		Medium	Medium	Medium			High
Install Fire Index Signs		High							High	High
Upgrade Emergency Sirens		Medium	High	High	Medium	Medium	Medium	High	High	High

Mitigation Action	Pembina	Pierce	Ramsey	Ransom	Renville	Richland	Rolette	Sargent	Sheridan	Sioux County/ Standing Rock Sioux
USDA FSA and NDSU Extension										
Adopt State Building Code		Medium						Medium	High	High
Blight Reduction			Low			Medium		High		
Study Codes Building/Zoning/Flood		High	Medium			Medium	Medium	Medium	High	High
Limit/Move Development from Hazard						Medium			High	High
Identify Geologic Hazard										
Space Weather Planning										
Livestock/Bovine Planning										
HazMat Planning			Medium	Medium						High
Vaccination Outreach Plan										
Vulnerability Plan										High
Debris Management Plan		High							Medium	Medium
Emergency Supply Plan		High				Medium	Medium		Medium	High
Community Wildfire Protection Plan	High						Medium			High
Sheltering Plan								High	High	
Drainage Studies					Medium	Medium	Medium			
Dam Emergency Plans				Low						
Drought Water Source Planning			High			Medium	Medium	Low		High
Emergency Planning				High						

Mitigation Action	Pembina	Pierce	Ramsey	Ransom	Renville	Richland	Rolette	Sargent	Sheridan	Sioux County/ Standing Rock Sioux
Mass Casualty Planning										
Harden to Space Weather								Medium		
Data Backups										
Add River Gages										
Access Roads										
Vaccination Clinics										
Disease Surveillance										
Disease Monitoring										
Public Health Actions						Medium	Medium			
Mosquito Control			Medium				Medium		Medium	
Fire Activities										
Cyber Countermeasures				High		Medium	Medium			
Homeland Security Activities			Medium	Medium			Medium			
HazMat Activities			Low							
Tornado Drills										
Expand Storm Spotters/StormReady										
Contractor Licensing Program										
Financial Mitigation Capabilities		High							High	
Water/Soil Conservation		Medium	Medium		Medium	Medium	Medium	High	Medium	High
Repair Slumping Roads							Medium			

Mitigation Action	Spirit Lake Tribe	Steele	Stutsman	Three Affiliated Tribes	Towner	Traill	Turtle Mountain	Walsh	Ward	Williams
NFIP Crop Insurance Promotion			Medium		High			Medium	High	Medium
NFIP Training	Medium					Medium				Medium
NFIP Participation		Medium	High						High	
Flood Studies/ Mapping Projects	High		High		High		High	Medium	Medium	Medium
Levee/Dam/Wall Projects							Medium			
Enroll in CRS			High					High	High	
Elevate Roads/Bridges, Increase Culvert Sizes	High	Medium	High		Medium	Medium		High	Medium	Medium
Monitor Dams/Levees	Medium		High					High		
Channel/Drain program/project	High	Medium	High		Low	Medium	High	High		Medium
Bank Stabilization	High	Medium				Low		Low		
Nonstructural Residential	Medium		High			Low	Low	High	Medium	
Detention Ponds						Low	Medium			
Mitigate Lagoon Sewer	High				Medium	Medium			Low	Medium
Crit. Facility Emergency Generators	High	Medium	High		Low	Medium		High	High	Medium
Protect/Upgrade Crit. Facilities	High				High	Medium	High		Medium	Medium
Public Education	High	Medium	High		Low	High	High	High	Medium	Medium
NOAA Radios		Medium				High	High		Medium	Medium
Firewise Program		Medium				Medium	High		Medium	Medium
Snow Fences		Medium	Low		Low		Low	Low		Medium

Mitigation Action	Spirit Lake Tribe	Steele	Stutsman	Three Affiliated Tribes	Towner	Traill	Turtle Mountain	Walsh	Ward	Williams
Bury/Upgrade Electric Lines							Medium			
Improve EM Communications	High	Medium	High	High			High	High	Medium	
Saferooms/Shelters	High		High	Medium	Medium		High	Medium	High	Medium
Upgrade EM/Services Equipment		Medium	High	High	High	High	Medium			Medium
Burn Bans			High			High	High		Medium	
Hazardous Fuels Reduction				High						
Improve Security/Safety at Crit. Facilities	Medium		High		High					Medium
Fire/HazMat Training							High			
Upgrade Signage	Medium	Medium			Low	High		Medium		
Install Fire Index Signs		Medium	High	High						
Upgrade Emergency Sirens	High	Medium			High	High	High		Low	Medium
USDA FSA and NDSU Extension										
Adopt State Building Code	Medium	Medium	High					High		
Blight Reduction	Low					Medium				Medium
Study Codes Building/Zoning/Flood	Medium	Medium	High		Medium		Medium	High	High	
Limit/Move Development from Hazard	Medium		High			Low	Low	High		

Mitigation Action	Spirit Lake Tribe	Steele	Stutsman	Three Affiliated Tribes	Towner	Traill	Turtle Mountain	Walsh	Ward	Williams
Identify Geologic Hazard			High	Medium						
Space Weather Planning										
Livestock/Bovine Planning			High	Medium						
HazMat Planning				High						
Vaccination Outreach Plan			High							
Vulnerability Plan				Medium						
Debris Management Plan			Medium					Medium		
Emergency Supply Plan	Medium	Medium	Medium					Medium		Medium
Community Wildfire Protection Plan			High							
Sheltering Plan	High			Medium		Low				Medium
Drainage Studies										
Dam Emergency Plans		Medium							Low	
Drought Water Source Planning		Medium		High		Medium				
Emergency Planning				High	Low					Medium
Mass Casualty Planning				High						
Harden to Space Weather			High							
Data Backups										
Add River Gages				Medium			Medium		Medium	
Access Roads										
Vaccination Clinics										
Disease Surveillance										

Mitigation Action	Spirit Lake Tribe	Steele	Stutsman	Three Affiliated Tribes	Towner	Traill	Turtle Mountain	Walsh	Ward	Williams
Disease Monitoring										
Public Health Actions	Low	Medium								
Mosquito Control		Medium				Medium				
Fire Activities				High						
Cyber Countermeasures			High					Medium		
Homeland Security Activities		Medium		Medium				High		Medium
HazMat Activities				Medium			High			
Tornado Drills										
Expand Storm Spotters/StormReady		Medium				High	High			
Contractor Licensing Program			High							
Financial Mitigation Capabilities			High							
Water/Soil Conservation		Medium	Medium					Medium		Medium
Repair Slumping Roads										Medium

Mitigation Action	City of Bismarck
NFIP Crop Insurance Promotion	
NFIP Training	
NFIP Participation	High
Flood Studies/ Mapping Projects	High
Levee/Dam/Wall Projects	
Enroll in CRS	High
Elevate Roads/Bridges, Increase Culvert Sizes	

Mitigation Action	City of Bismarck
Monitor Dams/Levees	
Channel/Drain program/project	
Bank Stabilization	
Nonstructural Residential	
Detention Ponds	
Mitigate Lagoon Sewer	High
Crit. Facility Emergency Generators	Medium
Protect/Upgrade Crit. Facilities	
Public Education	High
NOAA Radios	Medium
Firewise Program	
Snow Fences	High
Bury/Upgrade Electric Lines	
Improve EM Communications	High
Saferooms/Shelters	Medium
Upgrade EM/Services Equipment	
Burn Bans	
Hazardous Fuels Reduction	Medium
Improve Security/Safety at Crit. Facilities	
Fire/HazMat Training	
Upgrade Signage	Medium
Install Fire Index Signs	
Upgrade Emergency Sirens	Medium
USDA FSA and NDSU Extension	
Adopt State Building Code	Medium
Blight Reduction	
Study Codes Building/Zoning/Flood	
Limit/Move Development from Hazard	Medium
Identify Geologic Hazard	

Mitigation Action	City of Bismarck
Space Weather Planning	
Livestock/Bovine Planning	
HazMat Planning	
Vaccination Outreach Plan	Medium
Vulnerability Plan	
Debris Management Plan	
Emergency Supply Plan	
Community Wildfire Protection Plan	
Sheltering Plan	Medium
Drainage Studies	
Dam Emergency Plans	Medium
Drought Water Source Planning	
Emergency Planning	Medium
Mass Casualty Planning	High
Harden to Space Weather	
Data Backups	
Add River Gages	
Access Roads	
Vaccination Clinics	
Disease Surveillance	Medium
Disease Monitoring	Medium
Public Health Actions	Medium
Mosquito Control	Medium
Fire Activities	Medium
Cyber Countermeasures	
Homeland Security Activities	Medium
HazMat Activities	
Tornado Drills	
Expand Storm Spotters/StormReady	

Mitigation Action	City of Bismarck
Contractor Licensing Program	
Financial Mitigation Capabilities	
Water/Soil Conservation	
Repair Slumping Roads	Low

H.5 Local Plans Considering Repetitive Loss

Plan	Identifies RL Properties for Mitigation	Reason
Adams County	Y	
Barnes County	Y	
Benson County	Y	
Billings-Dunn-Golden Valley-Stark Counties	N	None identified
Bottineau County	Y	
Bowman-Slope Counties	N	None identified
Burke-Divide Counties	N	None identified
Burleigh County	N	No mention
Cass County	Y	
Cavalier County	Y	
Dickey County	Y	
Eddy-Wells Counties	Y	
Emmons County	N	None identified
Foster County	N	None identified
Grand Forks County	Y	
Grant County	N	None identified
Griggs County	N	None identified
Hettinger County	Y	
Kidder County	N	None identified
LaMoure County	Y	
Logan County	N	None Identified
McHenry County	Y	
McIntosh County	N	None identified
McKenzie County	N	None identified
McLean County	Y	
Mercer County	N	None identified
Morton County	Y	
Mountrail County	N	None identified
Nelson County	Y	
Oliver County	N	None identified
Pembina County	Y	
Pierce County	N	None identified
Ramsey County	Y	
Ransom County	Y	
Renville County	Y	
Richland County	Y	
Rolette County	Y	
Sargent County	N	None identified
Sheridan County	N	None identified

Plan	Identifies RL Properties for Mitigation	Reason
Sioux County/Standing Rock Sioux Tribe	N	None identified
Spirit Lake Tribe	Y	
Steele County	N	None identified
Stutsman County	Y	
Three Affiliated Tribes	N	No mention
Towner County	Y	
Traill County	Y	
Turtle Mountain	N	None identified
Walsh County	Y	
Ward County	Y	
Williams County	N	None identified
City of Bismarck	Y	

I. References and Datasets Appendix

I.1 References

I.2 Datasets

I.1 References

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Figure	Title	Source	Year
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Figure	Title	Source	Year
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Figure	Title	Source	Year
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Figure	Title	Source	Year
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4.7.33	Mumps Cases in North Dakota since 2000	North Dakota Department of Health and Human Services	2023
4.7.34	North Dakota Influenza Vaccination by Age	North Dakota Department of Health and Human Services	2023
4.7.35	North Dakota Pneumococcal Vaccination by Age	North Dakota Department of Health and Human Services	2023
4.7.36	Infant Vaccination Rates in North Dakota	North Dakota Health and Human Services	2023
4.7.37	Tuberculosis Cases in North Dakota since 2000	North Dakota Department of Health and Human Services	2023
4.7.38	Syphilis Cases in North Dakota since 2000	North Dakota Department of Health and Human Services	2023
4.7.39	Sexually Transmitted Infections in North Dakota 2016-2019	Centers for Disease Control and Prevention	2023
4.7.40	Salmonellosis Cases in North Dakota since 2000	North Dakota Department of Health and Human Services	2023
4.7.41	Malaria Cases in North Dakota since 2000	North Dakota Department of Health and Human Services	2023
4.7.42	Tularemia Cases in North Dakota since 2000	North Dakota Department of Health and Human Services	2023
4.7.43	West Nile Virus Cases in North Dakota since 2000	North Dakota Department of Health and Human Services	2023
4.7.44	Lyme Disease Cases in North Dakota since 2000	North Dakota Department of Health and Human Services	2023
4.7.45	Wild Bird HPAI Cases in North Dakota, 2022	USDA Animal and Plant Health Inspection Service	2023
4.7.46	Penn State University's Fusarium Risk Output for July 26,2023	Penn State Center for Environmental Informatics	2023

Figure	Title	Source	Year
4.7.47	Protected Areas for Rust	USDA Animal and Plant Health Inspection Service	2023
4.7.50	COVID-19 Cases in North Dakota by Race as of June 7, 2023	North Dakota Department of Health and Human Services	2023
4.7.51	North Dakotans with Diabetes	U.S. Diabetes Surveillance System	2021
4.7.52	North Dakotans with Heart and Lung Disease	Kaiser Family Foundation	2023
4.7.53	Lifestyle Factors Related to Health in North Dakota	Kaiser Family Foundation	2023
4.7.54	Mental Health in North Dakota	Kaiser Family Foundation	2023
4.7.55	COVID-19 Vaccinations by Race in North Dakota	North Dakota Department of Health and Human Services	2023
4.7.56	North Dakota COVID-19 Vaccinations by Age Group as of May 2023	North Dakota Department of Health and Human Services	2023
4.7.60	Rural Hospital Closures, 2005-2021	Bipartisan Commission on Rural Hospitals	2022
4.7.62	Veterinary Shortage Declaration Requests in North Dakota, 2022-2023	U.S. Department of Agriculture	2023
4.7.66	COVID-19 Impact on State GDP	North Dakota Department of Commerce	2023
4.7.67	COVID-19 Impact on State Labor Force	North Dakota Department of Commerce	2023
4.7.68	Crop Insurance Indemnity Amounts for Pests and Plant Diseases in North Dakota, 2018-2022	U.S. Department of Agriculture Risk Management Agency	2023
4.7.69	Local Hazard Mitigation Plans Rating Infectious Diseases and Pest Infestations	Local and Tribal Mitigation Plans	2023
4.8.2	Ownership of North Dakota Dams	North Dakota Dam Safety Program	2023
4.8.3	Primary Dam Functions	North Dakota Dam Safety Program	2023
4.8.4	Regulated Dam Types	National Inventory of Dams	2023
4.8.8	Federal or State Regulated Dams in ND, by Hazard Potential	National Inventory of Dams	2023
4.8.11	Built Year of North Dakota Dams, 2021	National Inventory of Dams	2023
4.8.12	North Dakota Regulated Dams by Classification and Condition	National Inventory of Dams	2023
4.8.13	North Dakota Dam Incidents since 2010	Association of State Dam Safety Officials	2023
4.8.16	Population Density near High Hazard Potential Dams	National Inventory of Dams, American Community Survey	2023
4.8.17	Landscan Density near High Hazard Potential Dams	Oak Ridge Laboratories, National Inventory of Dams	2023

Figure	Title	Source	Year
4.8.18	CEJST Exceedance Areas near High Hazard Potential Dams	Council on Environmental Quality, National Inventory of Dams	2023
4.8.19	Elderly Population and Dam Failure	U.S. Census Bureau, North Dakota Geographic Information System	2023
4.8.20	Nursing Homes and High Hazard Potential Dam Failure	U.S. Census Bureau, North Dakota Geographic Information System	2023
4.8.21	Disabled Residents and High Hazard Dam Failure Potential	U.S. Census Bureau, North Dakota Geographic Information System	2023
4.8.22	Households With Low English Proficiency and High Hazard Potential Dam Failure	U.S. Census Bureau, North Dakota Geographic Information System	2023
4.8.23	State Assets and Dam Failure Risk	National Inventory of Dams	2023
4.8.26	High Hazard Potential Dams in North Dakota	National Inventory of Dams	2023
4.8.28	Ranking of Dam Failure in Local and Tribal Mitigation Plans	Local and Tribal Mitigation Plans	2023
4.9.3	Impacts on the North American Power Grid, 13-14 March 1989	North American Electric Reliability Corporation	1990
4.9.5	Geomagnetic Storms Scale	NOAA Space Weather Prediction Center	2023
4.9.6	Radio Blackouts Scale	NOAA Space Weather Prediction Center	2023
4.9.7	Solar Radiation Storms Scale	NOAA Space Weather Prediction Center	2011
4.9.8	Aurora Forecast on a Normal Night and During a Large Event	NOAA Space Weather Prediction Center	2023
4.9.9	NERC Interconnections Map	North American Electric Reliability Cooperation	2023
4.9.10	Geoelectrical Hazard Map	United States Geologic Survey	2020
4.9.11	EHV Transformer Capacity	National Research Council	2008
4.9.12	Electrical Infrastructure	Homeland Infrastructure Foundation-Level Data	2022
4.9.14	Solar Cycle 25: Progression	NOAA Space Weather Prediction Center	2023
4.9.15	Kp8/Kp9 Events by Month, 1932-2007	National Research Council	2008
4.9.16	Estimated K Index, 10 May 2024	NOAA Space Weather Prediction Center	2024
4.9.17	Regional Reliability Councils	North American Electric Reliability Cooperation	2022
4.9.18	Population Density and Electric transmission Substations	Homeland Infrastructure Foundation-Level Data, American Community Survey	2021 2023
4.9.21	Regional Geoelectric Empirical EMTF Model	NOAA Space Weather Prediction Center	2023
4.9.22	Interconnectedness of Public and Economic Sectors	US Department of Homeland Security	2012

Figure	Title	Source	Year
4.9.25	Local and Tribal Hazard Mitigation Plans Rating Space Weather	Local and Tribal Hazard Mitigation Plans	2023
4.10.1	North Dakota Crime Statistics Summary, 2018-2022	Weltz/ND Attorney General's Office	2019-2023
4.10.3	Jurisdictions with Most Drug Cases Per 1,000 Residents	North Dakota Crime Statistics	2023
4.10.4	Human Trafficking Cases and Resources, 2020	North Dakota Human Trafficking Task Force	2020
4.10.5	Hate Crimes in North Dakota, 2020-2021	Uniform Crime Reporting	2022
4.10.6	Hate Crimes by Locality and Victim	Uniform Crime Reporting	2021
4.10.7	Locations for Crimes Against People	North Dakota Attorney General	2022
4.10.9	Crimes in North Dakota, 2019-2022	North Dakota Attorney General	2022
4.10.10	Crimes Against People in North Dakota, 2019-2022	North Dakota Attorney General	2022
4.10.11	Crime Trends, 2016-2021	Uniform Crime Reporting	2022
4.10.12	Illegal Drug Use in North Dakota	Kaiser Family Foundation	2023
4.10.13	Drug/Narcotic Seizures, 2019-2022	North Dakota Attorney General	2022
4.10.14	Hate Crimes by Motivation	Bureau of Justice Statistics	2023
4.10.17	Racial Minority Population and Hate Crimes	Uniform Crime Reporting, American Community Survey	2023
4.10.18	Drug Cases and CEJST Exceedance Tracts	Uniform Crime Reporting, Council on Environmental Quality	2023
4.10.19	Drug Cases and Children	Uniform Crime Reporting, American Community Survey	2023
4.10.20	ND Deaths of Despair and Homicides, 2012-2022	Justice Center	2023
4.10.23	Crime Production Costs in the U.S.	Anderson	2021
4.10.24	Law Enforcement Expenditures in the Midwest Region, 2021	Justice Center	2023
4.10.26	Adversarial Attacks in Local and Tribal Mitigation Plans	Local and Tribal Hazard Mitigation Plans	2023
4.11.1	HazMat Spill Decision Process	Unified Spill Reporting System	2023
4.11.2	Hazardous Material Labels	49 CFR § 172.400	2023
4.11.4	Location of Incidents Reported to the State Web EOC, 2019-2020	WebEOC	2021
4.11.5	Location of Incidents Reported to the State via HazConnect, 2021-23	HazConnect	2023
4.11.6	Incidents by Location	HazConnect	2023
4.11.7	Location of Incidents Reported to the National Response Center, 2018-2022	National Response Center	2023
4.11.8	Incident Locations, 2018-2022	National Response Center	2023

Figure	Title	Source	Year
4.11.10	Web EOC Incidents by Year	WebEOC	2021
4.11.11	Haz Connect Incidents by Year	Haz Connect	2023
4.11.12	HazConnect Incidents by Agency and Status, 2021-2023	HazConnect	2023
4.11.13	HazConnect Incidents by Type	HazConnect	2023
4.11.14	WebEOC Incidents by Quarter	WebEOC	2021
4.11.15	HazConnect Incidents by Quarter	HazConnect	2023
4.11.16	HazConnect Incidents by Time of Day	HazConnect	2023
4.11.17	Incident Type, 2018-2022	National Response Center	2023
4.11.18	Incidents by Cause, 2018-2022	National Response Center	2023
4.11.19	Incidents Involving Vehicles, 2018-2022	National Response Center	2023
4.11.20	Hazardous Material Incidents, 2018-2021	National Fire Incident Reporting System	2023
4.11.21	Hazardous Materials by Cause, 2017-2021	National Fire Incident Reporting System	2023
4.11.22	Mobile Homes and Rail Lines	Homeland Infrastructure Foundation-Level Data	2023
4.11.24	Hazardous Materials Treatment, Storage, or Disposal Sites	Environmental Protection Agency	2022
4.11.25	Responsible Party in NRC Incidents, 2018-22	National Response Center	2023
4.11.26	Incidents Resulting in Rail Track Closures, 2018-2022	National Response Center	2023
4.11.27	Materials in Derailed Rail Cars in Incidents, 2018-2022	National Response Center	2023
4.11.28	Ammonia Releases and Farm Operations	Environmental Protection Agency, U.S. Department of Agriculture	2023, 2019
4.11.29	Incident Consequences, 2018-2022	National Response Center	2023
4.11.30	People Evacuated from HazMat Incidents, 2018-2021	National Fire Incident Reporting System	2023
4.11.32	Local and Tribal Mitigation Plans and Hazardous Materials Release	Local and Tribal Hazard Mitigation Plans	2023
4.12.10	Areas of Landslides in North Dakota	North Dakota Geologic Survey	2023
4.12.11	Areas of Landslides in McKenzie County	North Dakota Geologic Survey	2023
4.12.12	Areas of Landslides and CEJST Communities	Council on environmental Quality, NDGIS	2023
4.12.13	Top Abandoned Mine Lands by County, 2022	North Dakota Public Service Commission	2022
4.12.14	Abandoned Mine Lands in North Dakota, 2022	North Dakota Public Service Commission	2022
4.12.15	Expansive Soils in the Northern Great Plains	Adapted from USGS, Olive et al.	1989

Figure	Title	Source	Year
4.12.16	North Dakota Radon Zones	Environmental Protection Agency	2023
4.12.17	Known and Suspected Erionite Areas	North Dakota Department of Environmental Quality	2023
4.12.18	Known Areas of Uranium Occurrence within 200 feet of the Surface	North Dakota Geologic Survey	2023
4.12.19	Arsenic Levels Exceeding 100ppb from Laboratory Tests	United States Geologic Survey National Water Information System	2021
4.12.20	Tectonic Features in North Dakota and the region	North Dakota Geologic Survey	2007
4.12.21	Earthquakes Felt in North Dakota	North Dakota Geologic Survey	2023
4.12.22	Locations of Past North Dakota Earthquakes	NDGIS	2023
4.12.25	Previous Yellowstone Eruption Ash Layers	National Park Service	2023
4.12.27	Landslide Annual Events	National Risk Index, FEMA	2023
4.12.29	Peak Ground Acceleration 2% Probability of Exceedance in 50 years	United States Geologic Survey	2023
4.12.33	Heart and Lung Co-Morbidities in North Dakota	Kaiser Family Foundation	2022
4.12.35	Expected Annual Building Loss from Landslides	National Risk Index, FEMA	2023
4.12.36	Housing Density Near Riverbanks	Federal Emergency Management Agency, American Community Survey	2021
4.12.37	CEJST Exceedance Areas	Council on Environmental Quality, FEMA, American Community Survey	2021
4.12.38	State Assets and Geologic Hazards	North Dakota Geologic Survey	2023
4.12.39	Agricultural Exposure to Earthquakes	National Risk Index, FEMA	2023
4.12.40	Crop Insurance Claims by County for Earthquakes	U.S. Department of Agriculture Risk Management Agency	2023
4.12.41	Expected Annual Loss for Landslides	National Risk Index, FEMA	2023
4.12.42	Expected Annual Loss for Earthquakes	National Risk Index, FEMA	2023
4.12.43	Crop Insurance Claims by Commodity for Earthquakes	U.S. Department of Agriculture Risk Management Agency	2023
4.12.45	Landslide Risk Index Score by County	National Risk Index, FEMA	2023
4.12.46	Earthquake Risk Index Score	National Risk Index, FEMA	2023
4.12.47	Local and Tribal Hazard Mitigation Plans Rating Geologic Hazard	Local and Tribal Hazard Mitigation Plans	2023

Figure	Title	Source	Year
4.13.1	Terrorist Screening Center Encounters, 2018-2022	North Dakota State and Local Intelligence Center	2023
4.13.2	Total Border Crossings into North Dakota, 1996-2022	Bureau of Transportation Statistics	2023
4.13.3	Highest Portal Declines, 2018-2022	Bureau of Transportation Statistics	2023
4.13.4	Right-Wing Attacks and Plots in the United States, 2014-2020	Center for Strategic and International Studies	2020
4.13.6	Terrorist Attacks and Plots by Perpetrator Orientation, 1994-2019	Center for Strategic and International Studies	2020
4.13.7	North Dakota Hate Crimes by County	Uniform Crime Reporting	2023
4.13.8	Communities with two or more ADL HEAT Incidents, 2018-2023	Anti-Defamation League	2023
4.13.9	ADL Heat Incidents by Type, 2018-2022	Anti-Defamation League	2023
4.13.10	North Dakota Hate Crimes by Motivation, 2020-2021	Bureau of Justice Statistics	2022
4.13.14	Local and Tribal Hazard Mitigation Plans Rating Adversarial Attacks	Local and Tribal Mitigation Plans	2023
4.14.4	Prison Locations	Homeland Foundation-Level Infrastructure Data	2023
4.14.6	Population Density	U.S. Census Bureau	2020
4.14.7	CEJST Exceedance Areas	U.S. Council on Environmental Quality	2023
4.14.13	Civil Disturbance in North Dakota Local Hazard Mitigation Plans	Local and Tribal Hazard Mitigation Plans	2023
4.15.8	Airfields in North Dakota	North Dakota GIS Hub	2023
4.15.9	Counties with more than two train-related incidents, 2018-2022	Federal Railroad Administration	2023
4.15.10	Railroad Network in North Dakota	North Dakota Department of Transportation	2023
4.15.11	Top Counties for Fatal Crashes by Weather Condition, 2017-2021	Fatality Analysis Reporting System	2023
4.15.12	Highway Network in North Dakota	North Dakota Department of Transportation	2022
4.15.13	Locations of Fatal Traffic Accidents in North Dakota, 2019-2021	North Dakota Department of Transportation	2022
4.15.15	Crude Oil Pipeline Networks in North Dakota	North Dakota Pipeline Authority	2023
4.15.16	Refined Product Network in North Dakota	North Dakota Pipeline Authority	2023
4.15.17	Natural Gas Pipeline Network in North Dakota	North Dakota Pipeline Authority	2023

Figure	Title	Source	Year
4.15.18	Natural Gas Liquids Network in North Dakota	North Dakota Pipeline Authority	2023
4.15.19	Aviation Incidents in North Dakota 2008-2022	National Transportation Safety Board	2023
4.15.20	Rail Incidents in North Dakota	Federal Railroad Administration	2023
4.15.21	North Dakota Rail Trespass Casualties	Federal Railroad Administration	2023
4.15.22	Fatal Vehicle Traffic Accidents, 2017-2022	National Highway Traffic Safety Administration	2023
4.15.23	Annualized Motor Vehicle Crash Rates	North Dakota Department of Transportation	2023
4.15.24	State Fatal Traffic Accident Type, 2017-2022	National Highway Traffic Safety Administration	2023
4.15.25	North Dakota Vehicles and Miles	North Dakota Department of Transportation	2022
4.15.26	North Dakota Pipeline Incidents	Pipeline and Hazardous Materials Safety Administration	2023
4.15.27	Pipeline Incidents, 2018-February 2023	Pipeline and Hazardous Materials Safety Administration	2023
4.15.28	NRC Pipeline Incidents, 2018-2022	National Response Center	2023
4.15.29	NRC Tank Incidents, 2018-2022	National Response Center	2023
4.15.30	North Dakota Rail Crossing Safety Feature Presence	Federal Railroad Administration	2023
4.15.31	North Dakota Interstate Traffic Distribution	North Dakota Department of Transportation	2022
4.15.32	North Dakota Fatal Motor Vehicle Accidents by Month	National Highway Traffic Safety Administration	2023
4.15.34	Changes in Aviation Incident Human Consequences	National Transportation Safety Board	2023
4.15.35	Railroad Incident Consequences by Cause, 2018-2021	Federal Railroad Administration	2023
4.15.36	Rail Lines and Population Density	Oak Ridge National Laboratories	2023
4.15.37	Motor Vehicle Human Consequences, 2017-2021	North Dakota Department of Transportation	2022
4.15.38	Weather Conditions Contributing to Vehicle Fatalities	North Dakota Department of Transportation	2022
4.15.39	Risk Factors in Motor Vehicle Accidents, 2020-2022	North Dakota Department of Transportation	2023
4.15.40	Proposed Bicycle/Highway Network Overlaps	North Dakota Department of Transportation	2023

Figure	Title	Source	Year
4.15.41	CEJST Exceedance and Motor Vehicle Fatalities	Council on Environmental Quality, North Dakota Department of Transportation	2022
4.15.42	Residents without Health Insurance by Percentage	American Community Survey	2023
4.15.43	Residents without Health Insurance by Total	American Community Survey	2023
4.15.45	Pipelines and Children	Oak Ridge Laboratories	2023
4.15.46	Pipelines and Elderly Residents	Homeland Infrastructure Foundation-Level Data, American Community Survey	2023
4.15.49	Bridges in North Dakota in Poor Condition	North Dakota Department of Transportation	2023
4.15.50	North Dakota Road Statistics	North Dakota Department of Transportation	2020
4.15.53	Critical Facilities within 1,000 feet of an Airport	Homeland Infrastructure Foundation-Level Data; American Community Survey	2023
4.15.54	Railroad Incidents in North Dakota by Company, 2018-2022	Federal Railroad Administration	2023
4.15.55	Aviation Incident Human Consequences	National Transportation Safety Board	2023
4.15.56	Annualized Human Consequences for North Dakota Vehicle Accidents, 2018-2022	North Dakota Department of Transportation	2023
4.15.57	Loss Estimation Methodology from the National Safety Council	National Safety Council	2023
4.15.59	Local and Tribal Mitigation Plans and Transportation Incidents	Local and Tribal Mitigation Plans	2023

U.S. Department of Homeland Security
Region 8
Denver Federal Center, Building 710
P.O. Box 25267
Denver, CO 80225-0267

FEMA

R8-MT

February 5, 2024

Darin Hanson, Director
Division of Homeland Security

North Dakota Department of Emergency Services
Fraine Barracks Lane, Building 35
Bismarck, ND 58504

Dear Director Hanson:

FEMA Region 8 is pleased to announce the approval of the North Dakota Enhanced Mitigation Mission Area Operations Plan. FEMA found the plan to be in compliance with Title 44 of the Code of Federal Regulations (CFR) Section 201.5, Enhanced State Mitigation Plans. The plan remains approved through February 4, 2029.

This plan approval confirms the continued eligibility of the State of North Dakota to receive non-emergency Stafford Act funding including Public Assistance (Categories C-G), Fire Management Assistance Grants (FMAG), Hazard Mitigation Grant Program (HMGP), Hazard Mitigation Grant Program-Post Fire (HMGP-Post Fire), Building Resilient Infrastructure and Communities (BRIC), Flood Mitigation Assistance (FMA), Flood Mitigation Assistance Swift Current, Safeguarding Tomorrow Revolving Loan Fund Program, and the Rehabilitation of High Hazard Potential Dam (HHPD) grant programs. As a State with a FEMA-approved Enhanced State Mitigation Plan, North Dakota is also eligible at the time of a disaster declaration to receive increased funds under the Hazard Mitigation Grant Program (HMGP), based on twenty percent of the total estimated eligible Stafford Act disaster assistance. The North Dakota Enhanced Mitigation Mission Area Operations Plan must be reviewed, revised as appropriate, and resubmitted to FEMA every five years to maintain eligibility to apply for funding through the programs referenced above.

We commend the State of North Dakota for its time and effort developing this plan and the State's continued commitment to reducing future disaster losses. Please contact Logan Sand, Community Planning Section Chief, at (720) 625-9657 with any questions.

Sincerely,

Nancy J. Dragani
Regional
Administrator

Enclosure
cc: Todd Joersz, State Hazard Mitigation Officer, North Dakota Department of Emergency Services
Justin Messner, Disaster Recovery Chief, North Dakota Department of Emergency Services

Eric Upton, Planning Section Chief, North Dakota Department of Emergency Services
Kathleen Donahue, Deputy Planning Chief and Co-Accreditation Manager, North Dakota Department of Emergency Services

State Mitigation Plan Review Tool

The State Mitigation Plan Review Tool (Plan Review Tool) demonstrates and documents how the state mitigation plan meets the regulations set forth in 44 CFR Part 201 and offers FEMA mitigation planners an opportunity to provide feedback to the state.

The Regulation Checklist must be completed by FEMA. The FEMA Plan Approver must reference the State Mitigation Planning Policy Guide when completing the Plan Review Tool. The purpose of the checklist is to identify the location of relevant or applicable content in the plan by element/sub-element and to determine if each requirement has been "Met" or "Not Met."

The Required Revisions summary at the bottom of each element must clearly explain the revisions that are required for plan approval. Required revisions must be explained for each plan sub-element that is "Not Met." Sub-elements should be referenced by the appropriate number, where applicable (e.g., S2-a, S2-b). Requirements for each element and sub-element are described in detail in Sections 3 and 4 of the State Mitigation Planning Policy Guide.

The HHPD section and FMAG sub-elements only need to be completed if the state is pursuing eligibility for those grant programs.

The Plan Assessment must be completed by FEMA. This assessment provides more comprehensive feedback to the state to acknowledge where the plan exceeds minimum requirements and provides suggestions for improvements. FEMA will describe the strengths that are demonstrated and highlight examples of best practices. FEMA's suggestions for improvement are not required to be made for plan approval.

For greater clarification of the elements in the regulation checklist, please see Sections 3 and 4 in the State Mitigation Planning Policy Guide. This document defines terms and phrases used within this review tool.

1. Plan and Review Information

Plan Information	
State	North Dakota
Title and Date of Plan	State Enhanced Mitigation Mission Area Operations Plan December 1, 2023
Plan Update Version	9
State Point of Contact Name	Kathleen Donahue
Title	Deputy Planning Chief
Agency	North Dakota Department of Emergency Services (NDDES)
Address	Fraine Barracks Lane, Bldg 35 Bismarck, ND 58504
Phone Number	701-328-8113
Email	kdonahue@nd.gov
Meets mitigation planning requirements for HHPD?	Yes
Meets mitigation planning requirements for FMAG?	Yes

Review Information	
Date Received by FEMA region	December 4, 2023; January 19, 2024
FEMA Reviewer (Planning)	Logan Sand, Section Chief, Community Planning
FEMA Reviewer (Planning)	Robert Pressly, Community Planner
FEMA Reviewer (Planning)	Ariana Borrello, Community Planner
FEMA Reviewer (Planning)	Brooke LaPlaca, Planning Program Analyst
FEMA Reviewer (HMA)	Maryanna Schmuki, Grants Management Specialist
FEMA Reviewer (HMA)	Shannon Burke, Emergency Management Specialist
FEMA Reviewer (HMA)	Cynthia Palmer, Grants Management Specialist
FEMA Reviewer (HMA)	Betty Gartley, Grants Management Specialist
FEMA Reviewer (406)	Luis Andrade, General Engineer
FEMA Reviewer (Earthquake Program)	Sean McGowan, Earthquake Program Manager
FEMA Reviewer (Building Sciences)	Robert McKay, Building Codes Coordinator
FEMA Reviewer (EHP)	Bridget Mehaffey, Environmental Protection Specialist
FEMA Reviewer (Planning/BRIC Technical Assistance Team)	Kelsey Schill, Hazard Mitigation Specialist
FEMA Reviewer (Dam Safety)	Rich Hansen, Program Specialist – Dam Safety
FEMA Reviewer (NFIP)	Matt Piscopo, Flood After Fire Specialist
FEMA Reviewer (RiskMAP)	Madeleine Pluss, Management and Program Analyst
Plan Status (Not Approved, Approvable Pending Adoption, Approved)	Not Approved: December 26, 2023 Approvable Pending Adoption: January 23, 2024 Approved: February 5, 2024

SUMMARY	YES	NO
STANDARD STATE MITIGATION PLAN		
Does the plan meet the standard state mitigation plan requirements?	☒	☐
ENHANCED STATE MITIGATION PLAN		
Does the plan meet the enhanced state mitigation plan requirements?	☒	☐

2. Standard State Mitigation Plan Regulation Checklist

PLANNING PROCESS

Requirements	Location in Plan (section and/or page number)	Met / Not Met
S1. Does the plan include a description of the process used to develop the plan? [44 CFR §§ 201.4(b) and 201.4(c)(1)]		
S1-a. Does the plan describe the current process used to update the plan, including how the plan was prepared, the schedule or time frame, specific milestones and activities, the agencies and stakeholders who were involved in the process, and if the mitigation planning process was integrated to the maximum extent possible with other state planning efforts?	Section 1 details the overall Planning Process. Specifically, please see section 1.1.3 Schedule for schedule, milestones, and activities, and section 1.2.1 Structure for agencies and stakeholders. Appendix B provides the comprehensive list of participating individuals and agencies involved in the planning process.	Met
S2. Does the plan describe how the state coordinated with other agencies and stakeholders? [44 CFR §§ 201.4(b) and 201.4(c)(1)]		
S2-a. Does the plan describe how the state coordinated with other state agencies, appropriate federal agencies, and other stakeholders, and how they were involved in the process?	Coordination is described throughout the entirety of the plan; Sections 1 and 5 provide the most comprehensive descriptions. Section 1 details the planning process and Section 5 subsection 5.1 also provides details on inter and intra agency coordination. Appendix B provides the comprehensive list of participating individuals and agencies involved in the planning process. SHMT Meeting attendance in App. C, C.4.4 and C.5.4. on page 112; C.8.4. on page 161; Section 4, Pages 4-5 and 9.	Met

Planning Process Required Revisions:
Click or tap here to enter text.

HAZARD IDENTIFICATION AND RISK ASSESSMENT

Requirements	Location in Plan (section and/or page number)	Met / Not Met
S3. Does the risk assessment include an overview of the type and location of all natural hazards that can affect the state? [44 CFR § 201.4(c)(2)(i)]		
S3-a. Does the plan include a current overview of all natural hazards that can affect the state, including the type, location and previous occurrences?	The plan includes all natural hazards that can impact ND. Hazard Profiles are listed in section 4. Each hazard profile follows a standardized outline for ease of review. The type will be the name that starts each profile, and location and previous occurrences are both clearly identified sub headers within the profile.	Met
S4. Does the risk assessment provide an overview of the probabilities of future hazard events? [44 CFR § 201.4(c)(2)(i)]		
S4-a. Does the risk assessment provide an overview of the probability of future hazard events that includes projected changes in the location, range of anticipated intensities, frequency, and/or duration of each natural hazard?	Please see Section 3; the whole section is specific to climate variability and potential climate change as it applies to ND. Additionally, Hazard Profiles are listed in Section 4. Each hazard profile follows a standardized outline for ease of review. Location, Intensity, Frequency, and Duration is described for each of the natural hazards, and can be found in the "Future Conditions" subsection (page numbers will vary per hazard profile)	Met
S4-b. Does the probability include considerations of changing future conditions, including climate change (e.g., long-term weather patterns, average temperature, and sea levels) on the type, location and range of anticipated intensities of identified hazards?	Please see Section 4. Each hazard profile follows a standardized outline for ease of review. "Future Conditions" is a subsection that describes multiple changing, future conditions applicable to ND for each of the natural hazards (page numbers will vary per hazard profile)	Met

Requirements	Location in Plan (section and/or page number)	Met / Not Met
S5. Does the risk assessment address the vulnerability of state assets located in hazard areas and estimate the potential dollar losses to these assets? [44 CFR §§ 201.4(c)(2)(ii) and 201.4(c)(2)(iii)]		
S5-a. Does the risk assessment include an overview and analysis of the vulnerability to state assets from the identified hazards as well as a summary of the most vulnerable assets?	Please see Section 4 subsections 4.1.2, 4.1.3, and 4.2. See maps showing state assets and narrative for relevant sections: Floods Section 4.1.1.10, p.41; Fire 4.2.2.5 pp. 20-21; Drought 4.3.2.5, pp. 15-16; Severe Winter Weather 4.5.2.5, pp.39-40; Severe Summer Weather 4.6, Figure 4.6-54, p.39; Geologic, Section 4.12.2.5 p. 31; Dam Failure, 4.8.2.5, pp.23-24. Flood map in Flood Section 4.1.1.10 p. 40, 41 figure 4.1.37	Met
S5-b. Does the risk assessment estimate potential dollar losses to state assets located in identified hazard areas?	Hazard Profiles are listed in section 4. Each hazard profile follows a standardized outline for ease of review. National Risk Index (NRI) data was used to project annual loss and exposure value dollar losses to a variety of state assets, for example, buildings and crops, per applicable hazard (page numbers will vary per hazard). See maps showing state assets and narrative for relevant sections: Floods Section 4.1.1.10, p.41; Fire 4.2.2.5 pp. 20-21; Drought 4.3.2.5, pp. 15-16; Severe Winter Weather 4.5.2.5, pp.39-40; Severe Summer Weather 4.6, Figure 4.6-54, p.39; Geologic, Section 4.12.2.5 p. 31; Dam Failure, 4.8.2.5, pp.23-24 Flood map Flood, Section 4.1.1.10 p. 40, 41 revised figure 4.1.37	Met
S6. Does the risk assessment include an overview and analysis of jurisdictions' vulnerability to the identified hazards and the potential losses? [44 CFR §§ 201.4(c)(2)(ii) and 201.4(c)(2)(iii)]		
S6-a. Does the risk assessment provide an overview and analysis of vulnerable jurisdictions based on the state and local government risk assessments?	Hazard Profiles are listed in section 4. Each hazard profile follows a standardized outline for ease of review. Every hazard includes a CEJST analysis, and demographic and socioeconomic information from the U.S.	Met

Requirements	Location in Plan (section and/or page number)	Met / Not Met
	Census Bureau, amongst other data sources, was also utilized to analyze vulnerability. (page numbers will vary per hazard). Appendix D.8.7 p162-180; Flood Section 4.1.1.2 pp.36-37 National Risk Index data included at; Floods 4.1.1.17.1 p. 60; Fire, 4.2.3.1 pp.34-35;, Drought 4.3.3.1 p 38; Severe Winter Weather, 4.5.3.1, pp. 56-59; Severe Summer Weather 4.6.2.12, p.56, Geologic 4.12.2.12, pp.41-42 Addressing vulnerable populations – see following sections: Flood 4.1.1.6 p. 28 and 36-37; Fire 4.2.2.1, pp.9-11; Drought 4.3.2.1, p. 12; Severe Winter Weather 4.5.2, pp 24-29; Severe Summer Weather 4.6.2.1 pp. 30-31; Dam Failure 4.8.2.1, pp.14,17-22; Geologic 4.12.2.4, p. 31	
S6-b. Does the risk assessment include an overview and analysis of the potential losses to the identified vulnerable structures based on estimates in the local risk assessments as well as the state risk assessment?	Hazard Profiles are listed in section 4. Each hazard profile follows a standardized outline for ease of review. National Risk Index (NRI) data was used to project annual loss and exposure value dollar losses to a variety of state assets, for example, buildings and crops, per applicable hazard (page numbers will vary per hazard).	Met
S7. Was the risk assessment revised to reflect changes in development? [44 CFR § 201.4(d)]		
S7-a. Does the plan provide a summary of recent development and potential or projected development in hazard-prone areas based on state and local government risk assessments?	Please see Section 2, subsection 2.2.2.2.1 Additions are highlighted for each hazard section: Floods 4.1.1.16, p. 55; Fire 4.2.2.11, p. 29; Drought 4.3.2.11 pp. 28-29; Winter 4.5.2.11.2 p. 55; Summer 4.6.2.11 p. 50; Dams 4.8.2.11.2 pp. 32; Geologic 4.12.2.4 on p.31 and 4.12.2.10 p.36. Section 6, PTP-27, p. 47	Met
Hazard Identification and Risk Assessment Required Revisions: Click or tap here to enter text.		

STATE MITIGATION CAPABILITIES

Requirements	Location in Plan (section and/or page number)	Met / Not Met
S8. Does the plan discuss the evaluation of the state's hazard management policies, programs, capabilities, and funding sources to mitigate the hazards identified in the risk assessment? [44 CFR § 201.4(c)(3)(ii)]		
S8-a. Does the plan include an evaluation of state laws, regulations, policies and programs related to hazards that improve or impede resilience to future natural hazard events and other future conditions, including the effects of climate change?	Hazard Profiles are listed in Section 4. Each hazard profile follows a standardized outline for ease of review. Generally, laws, regulations, policies, and programs are discussed in the "Community Resilience" subsection but can be found throughout the entire hazard profile. See Capability Analysis, figure 5.3.1.1, pp. 3-6	Met
S8-b. Does the plan include a general discussion of state funding capabilities for hazard mitigation actions and projects?	Please see Section 5, subsection 5.3.4, and Figures 5.15 and 5.16.	Met
S8-c. Does the plan include a summary of obstacles, challenges and proposed solutions related to any state capabilities, including a brief discussion of potential strategies for overcoming any challenges related to implementing and enforcing hazard-resistant building codes statewide, as applicable, and changes since the previous plan approval?	Please see Section 5, subsection 5.3. State Capabilities are listed and described, and within each, "Implementation Challenges" and "Suggested Improvements to the Program" are included.	Met

State Mitigation Capabilities Required Revisions:

Click or tap here to enter text.

MITIGATION STRATEGY

Requirements	Location in Plan (section and/or page number)	Met / Not Met
S9. Does the mitigation strategy include goals to reduce long-term vulnerabilities from the identified hazards? [44 CFR § 201.4(c)(3)(i)]		
S9-a. Does the plan identify hazard mitigation goals representing what the state seeks to accomplish through mitigation plan implementation using a wide range of funding, including non-FEMA funding?	Please see Section 6 subsection 6.1.2 Mitigation Program Goals and Objectives (page 781 of 1807) and Section 6.3.4 2023-2028 Mitigation Actions (page 797 of 1807)– the chart lists mitigation actions the state seeks to accomplish. Each action aligns with a goal, and each action identifies potential funding sources, with numerous goals identifying non-FEMA funding opportunities.	Met
S9-b. Are the goals consistent with the hazards and vulnerabilities identified in the risk assessment?	Please see Section 6 subsection 6.1.2 Mitigation Program Goals and Objectives (page 781 of 1807) and Section 6.3.4 2023-2028 Mitigation Actions (page 797 of 1807) – the chart lists mitigation actions the state seeks to accomplish. Each action aligns with a goal, and each action identifies specific hazards that they will address once implemented.	Met
S10. Does the plan prioritize mitigation actions to reduce vulnerabilities identified in the risk assessment? [44 CFR §§ 201.4(c)(3)(i), 201.4(c)(3)(ii) and 201.4(c)(3)(iii)]		
S10-a. Does the plan identify actions based on the current risk assessment to reduce the vulnerability of jurisdictions within the state, as well as the vulnerability of state assets as described in Elements S5 and S6?	Hazard Profiles are listed in Section 4. Each hazard profile follows a standardized outline for ease of review. Subsection “Critical Facilities, Community Lifelines, and State Assets” covers current risk assessment to reduce vulnerability of state assets and Appendix D.7 lists State Assets.	Met
S10-b. Does the plan describe the process used by the state to evaluate and prioritize actions that are cost-effective, environmentally sound, and technically feasible?	Please see Section 6, subsection 6.3.3 Mitigation Action Identification and Prioritization Methodology (page 796 of 1807).	Met

Requirements	Location in Plan (section and/or page number)	Met / Not Met
S10-c. Does the plan describe how each action contributes to the hazard mitigation goals?	Please see Section 6 subsection 6.1.2 Mitigation Program Goals and Objectives (page 781 of 1807) and Section 6.3.4 2023-2028 Mitigation Actions (page 797 of 1807) – the chart lists mitigation actions the state seeks to accomplish. Each action aligns with a goal. See Goals in Mitigation Strategy. See Section 6, Mitigation Strategy	Met
S10-d. Does the plan describe how local government mitigation strategies link to the state mitigation strategy?	Please see Section 6 subsection 6.1.1 and Appendix H.4 summarizes local mitigation actions.	Met
S11. Does the plan identify current and potential sources of funding to implement mitigation actions and activities? [44 CFR § 201.4(c)(3)(iv)]		
S11-a. Do mitigation activities include the identification of current and/or potential sources of federal, state, local or private funding for implementation?	Please see Section 6 subsection 6.3.4 2023-2028 Mitigation Actions (page 797 of 1807) – the chart lists mitigation actions the state seeks to accomplish. Each action identifies potential funding sources, which NDDES has identified a mix of state, federal, and private and Please see Section 5, subsection 5.3.1. Mitigation strategy, Section 6, pp.58, 60, 61, 62	Met
S11-b. Does the plan identify FEMA mitigation funding sources (if applicable), including, but not limited to: HMGP, BRIC, FMA and PA Mitigation, at a minimum?	Please see Section 6 subsection 6.3.4 2023-2028 Mitigation Actions (page 797 of 1807) – the chart lists mitigation actions the state seeks to accomplish. Each action identifies potential funding sources and mitigation actions eligible for HMA funding list the various HMA grants the action could apply to and Please see Section 5, subsection 5.3.2. Mitigation strategies at Section 6.	Met

Requirements	Location in Plan (section and/or page number)	Met / Not Met
S12. Was the plan updated to reflect progress in statewide mitigation efforts and changes in priorities? [44 CFR § 201.4(d)]		
S12-a. Does the plan provide a narrative of the status of each mitigation action in the previous plan?	Please see Section 6 subsection 6.3.4 2023-2028 Mitigation Actions (page 797 of 1807) – the chart lists mitigation actions. All actions from the previous plan are accounted for as "completed" and the year that was accomplished is listed, "removed" with an explanation of why the action is no longer relevant, or "deferred" meaning the action was still valid and will be ongoing into the next planning cycle/plan update. Mitigation strategies at Section 6.	Met
S12-b. Was the prioritization of mitigation actions and activities updated based on the updated analysis of risks, capabilities and progress?	Yes; prior to the creation of the 2023 mitigation actions and the assignment of high, medium, or low priority the updated hazard profiles had been reviewed (Section 4), the activity of reassessing and scoring hazards by PRI was completed (Section 4, Figure 4.0.11) and after reviewing the 2019-2022 Progress Report, which summarizes all progress made on all mitigation actions that were included in the last plan (Appendix F.1). This collective resulted in the new actions and priority assignments (Section 6, subsection 6.3.4 2023-2028 Mitigation Actions (page 797 of 1807)).	Met

Mitigation Strategy Required Revisions:

Click or tap here to enter text.

LOCAL PLANNING COORDINATION AND CAPABILITY BUILDING

Requirements	Location in Plan (section and/or page number)	Met / Not Met
S13. Does the plan generally describe and analyze the effectiveness of local government mitigation policies, programs, and capabilities? [44 CFR § 201.4(c)(3)(ii)]		
S13-a. Does the plan provide a summary of current local government policies, programs and capabilities of jurisdictions to accomplish hazard mitigation?	Appendix H.3 summarizes local government capabilities.	Met
S13-b. Does the plan describe the effectiveness of local government mitigation policies, programs and capabilities?	Please see Section 5, subsection 5.4 p. 59-60 and mitigation action, PTP-28 on page 46	Met
S14. Does the plan describe the process to support the development of approvable local government mitigation plans? [44 CFR §§ 201.3(c)(5) and 201.4(c)(4)(i)]		
S14-a. Does the plan describe how the state supports developing or updating FEMA-approvable mitigation plans?	Please see Section 6, subsection 6.2.1 pages 6-7	Met
S14-b. Does the plan provide a brief summary of barriers to developing or updating, adopting, and implementing FEMA-approved local government mitigation plans based on an analysis of plan and jurisdiction coverage data and trends across the state and steps to remove barriers to help local governments advance mitigation planning, including how plan and jurisdiction coverage data and trends inform those steps?	Please see Section 5, subsection 5.4 pp 59-60	Met
S15. Does the plan describe the criteria for prioritizing funding? [44 CFR § 201.4(c)(4)(iii)]		
S15-a. Does the plan describe criteria for prioritizing jurisdictions to receive planning and project grants under available federal and non-federal programs?	Please see Section 6, subsection 6.3.5 and subsection 6.2.2.1 Criteria for Funding Priorities (page 785 of 1807).	Met

Requirements	Location in Plan (section and/or page number)	Met / Not Met
S16. Does the plan describe the process and time frame to review, coordinate, and link local and tribal mitigation plans with the state mitigation plan? [44 CFR §§ 201.3(c)(6), 201.4(c)(2)(ii), 201.4(c)(3)(iii), and 201.4(c)(4)(ii)]		
S16-a. Does the plan describe the state's process and time frame to review and submit approvable local and tribal mitigation plans to FEMA?	ND is a PAS program for local mitigation planning. This is described in Section 6, subsection 6.2.1 Mitigation Planning Program, subsection 6.2.1.1 State-Managed Plan Review Process (page 783 of 1807), subsection 6.2.1.2 Local/Tribal Mitigation Progress, 6.2.1.3 Capability and Capacity Building (page 784 of 1807).	Met
S16-b. Does the plan describe the state's process and time frame to share risk assessment data and mitigation priorities with local governments for their plan updates, as well as integrate local risk assessment and mitigation actions into the state mitigation plan updates?	Please see Section 7, subsection 7.1.3	Met
Local Planning Coordination and Capability Building Required Revisions: Click or tap here to enter text.		

REVIEW, EVALUATION, AND IMPLEMENTATION

Requirements	Location in Plan (section and/or page number)	Met / Not Met
S17. Is there a description of the method and schedule for keeping the plan current? [44 CFR §§ 201.4(c)(5)(i) and 201.4(d)]		
S17-a. Does the plan describe the agency/office responsible for monitoring, evaluating and updating the plan?	It is explicitly stated that the plan maintenance responsibilities lie with NDDES and the SHMT in Section 7, Plan maintenance.	Met
S17-b. Does the plan describe the schedule for monitoring, evaluating, and updating the plan?	Please see Section 7, subsections 7.1.1, 7.1.2, and 7.1.3.	Met

Requirements	Location in Plan (section and/or page number)	Met / Not Met
S18. Does the plan describe the systems for monitoring implementation and reviewing progress? [44 CFR §§ 201.4(c)(5)(ii) and 201.4(c)(5)(iii)]		
S18-a. Does the plan describe the system for tracking the implementation of the mitigation activities and projects identified in the mitigation strategy, including all mitigation activities and not just those funded by FEMA?	Please see Section 7, subsections 7.2 and 7.4	Met
S18-b. Does the system include the schedule, the agency/office responsible for coordination, and the role of the agencies/offices identified in the mitigation strategy as responsible for implementation of actions?	Please see Section 6 subsection 6.3.4 2023-2028 Mitigation Actions (page 797 of 1807) – the chart lists mitigation actions the state seeks to accomplish. Each action is assigned a lead agency which assumes accountability for the implementation of the mitigation action. The lead agency will be supported with implementation by the additional listed agencies but assumes the coordination of leveraging as much or as little support as needed to be successful in implementation. Please see Section 7 subsection 7.1.1 that states the plan is reviewed annually, which includes reviewing progress of mitigation actions, or implementation.	Met
S18-c. Does the plan describe a system for reviewing progress on achieving the mitigation strategy's goals that includes the criteria and process for evaluating progress?	Please see Section 7, subsection 7.4.4.	Met

Review, Evaluation, and Implementation Required Revisions: Click or tap here to enter text.

ADOPTION AND ASSURANCES

Requirements	Location in Plan (section and/or page number)	Met / Not Met
S19. Did the state provide documentation that the plan has been formally adopted? [44 CFR § 201.4(c)(6)]		
S19-a. Did the state provide documentation of formal adoption by the highest elected official or designee prior to FEMA approval?	See Governor Burgum resolution dated January 31, 2024.	Met
S20. Did the state provide assurances? [44 CFR § 201.4(c)(7)]		
S20-a. Does the plan include assurances that the state will manage and administer FEMA funding in accordance with applicable federal statutes and regulations?	Please see Section 7 and subsection 7.4	Met
S20-b. Does the plan include assurances that the state will update its plan whenever necessary to reflect changes in state or federal laws and statutes?	Please see Section 7, subsection 7.2.3	Met

Adoption and Assurances Required Revisions:

Click or tap here to enter text.

HIGH HAZARD POTENTIAL DAMS

Requirements	Location in Plan (section and/or page number)	Met / Not Met
HHPD1. Did Element S2 (planning process) describe how the state dam safety agency, other agencies, and stakeholders participated in the planning process and contributed expertise, data, studies, information, etc. relative to high hazard potential dams?		
HHPD1-a. Does the plan describe how the state dam safety agency, other agencies, and stakeholders were involved in the planning process?	Dam Failure is Hazard Profile Section 4.8. The dam management and administration structure is explained in subsection 4.8.1.1. Section 1 details the planning process, which describes how state agencies (including those that manage and administer dam oversight) were involved in the planning process. Appendix B provides the comprehensive list of participating individuals and agencies involved in the planning process.	Met
HHPD1-b. Does the plan describe the types of data contributed?	Please see Section 4.8 Dam Failure. Public state and federal data sources, and peer-reviewed journal articles, were all utilized in this hazard profile. Citations are inserted in-text and Figures that summarize data are labeled with the source throughout the hazard profile. Full references are available in Appendices I.1 and I.2.	Met
HHPD2. Did Element S6 (risk assessment) address all dam risk for high hazard potential dams in the risk assessment?		
HHPD2-a. Does the plan provide a list of high hazard potential dams that have been identified by the state with their names, National Inventory of Dams identification numbers, locations by jurisdiction, and other relevant information, as well as maps?	Please see Section 4.8 Dam Failure Hazard Profile, specifically Figures 4.8.2, 4.8.8, 4.8.11, 4.8.12, 4.8.13, and 4.8.17, See Appendix E, E.8.1, and high hazard potential dams at E.8.3	Met

Requirements	Location in Plan (section and/or page number)	Met / Not Met
HHPD2-b. Does the plan summarize statewide vulnerabilities to/from high hazard potential dams from hazards and the potential consequences associated with dam incidents?	Please see Section 4.8.2.10 and Appendix E.8.1 for the summary of statewide dam vulnerability	Met
HHPD2-c. Does the plan document limitations and describe the approach to address deficiencies?	Please see Section 5 subsection 5.3.1.8.3	Met
HHPD3. Did Element S9 (mitigation goals) include mitigation goals to reduce long-term vulnerabilities from high hazard potential dams?		
HHPD3-a. Does the plan address a reduction in vulnerabilities to/from high hazard potential dams from hazards and the potential consequences associated with dam incidents as part of their own goals or with other long-term strategies?	Please see Section 6 subsection 6.1.2, Goal 3, Objective 3.7	Met
HHPD3-b. Does the plan link the proposed actions to reduce long-term vulnerabilities consistent with the goals?	Please see Section 6, subsection 6.1.1.2. 10 of the 20 mitigation actions targeting the Dam Failure Hazard are identified as long-term actions (Please see Section 6 subsection 6.3.4 2023-2028 Mitigation Actions (page 797 of 1807) for mitigation actions).	Met
HHPD4. Did Element S10 (mitigation actions) prioritize mitigation actions and activities to reduce vulnerabilities from high hazard potential dams?		
HHPD4-a. Does the plan include actions to reduce vulnerabilities to/from high hazard potential dams?	Please see Section 6 subsection 6.3.4 2023-2028 Mitigation Actions (page 797 of 1807) – the chart includes a total of 20 mitigation actions targeted towards the Dam Failure Hazard	Met

Requirements	Location in Plan (section and/or page number)	Met / Not Met
HHPD4-b. Does the plan describe the process to evaluate and prioritize actions related to high hazard potential dams that are cost-effective, environmentally sound and technically feasible?	Actions related to high hazard potential dams are evaluated in the same manner as other mitigation actions to be cost-effective, environmentally sound, and technically feasible. Please see Section 6, subsection 6.3.3 Mitigation Action Identification and Methodology (page 796 of 1807).	Met
HHPD4-c. Does the plan describe how each action to reduce risks related to high hazard potential dams contributes to the goals and describe how strategies are linked to the state mitigation strategy?	Please see Section 4.8.2.10 which describes studies, state actions, laws, and tools being used to reduce high and medium hazard dams. Mitigation Strategy, Section 6, p. 30	Met
HHPD5. Did Element S11 (funding sources) identify current and potential sources of funding to implement mitigation actions and activities for high hazard potential dams?		
HHPD5-a. Does the plan include various funding sources to mitigate vulnerabilities to and from high hazard potential dams from hazards and the potential consequences associated with dam incidents, as well as funding sources to rehabilitate or remove high hazard potential dams?	Please see Section 5 subsection 5.3.1.8.3. Also, Section 6 subsection 6.3.4 2023-2028 Mitigation Actions (page 797 of 1807) – the mitigation actions listed identify potential funding sources, federal and non-federal, for actions pertaining to dam failure.	Met
HHPD6. Did Element S13 (local coordination) generally describe and analyze the effectiveness of local mitigation policies, programs, and capabilities that address high hazard potential dams?		

Requirements	Location in Plan (section and/or page number)	Met / Not Met
HHPD6-a. Does the plan provide a summary of the local policies, programs, and capabilities to implement mitigation actions and reduce vulnerabilities from high hazard potential dams from hazards and the potential consequences associated with dam incidents?	Please see Section 4.8 subsection 4.8.3.3 and Figure 4.8.24 for a summary of the dam failure hazard at the local and tribal hazard mitigation plan level.	Met
HHPD6-b. Does the plan describe challenges to implementing local mitigation policies, programs and capabilities to reduce vulnerabilities to and from high hazard potential dams and the approach to overcome these challenges?	Please see Section 4.8.3; and 4.8.3.3 most local jurisdictions regard dam failure as a low priority and not all local hazard mitigation plans include dam failure as a hazard; if local jurisdictions do not recognize or view the hazard as a high priority, they are not going to devote resources or attention to the hazard.	Met
HHPD6-c. Does the plan describe opportunities for implementing mitigation actions to reduce risks to and from high hazard potential dams through local capabilities?	Please see Section 4.8.2.10 for local capability opportunities.	Met
HHPD7. Did Element S15 (prioritizing funding) describe the criteria for prioritizing funding for high hazard potential dams?		
HHPD7-a. Does the plan describe the method for funding actions to reduce vulnerabilities to and from high hazard potential dams if these actions were prioritized differently than mitigation actions for other hazards?	Please see Section 5, subsection 5.3.2.1.6. Please see Section 6, subsection 6.3.5 and subsection 6.2.2.1 Criteria for Funding Priorities (page 785 of 1807).	Met

Requirements	Location in Plan (section and/or page number)	Met / Not Met
HHPD7-b. Does the plan document limitations and describe the approach to addressing deficiencies?	Please see Section 5.3.2.1.6.	Met
HHPD Required Revisions: Click or tap here to enter text.		

FIRE MANAGEMENT ASSISTANCE GRANTS

Requirements	Location in Plan (section and/or page number)	Met / Not Met
FMAG1. Does the plan address wildfire risks? [44 CFR 201.4(c)(2); 44 CFR § 204.51(d)(2)]		
FMAG1-a. Does the risk assessment provide an overview of the location and previous occurrences of wildfire hazards in the state?	Hazard Profiles are listed in section 4. Wildfire is addressed in 4.2. Each hazard profile follows a standardized outline for ease of review. Location and previous occurrences are both clearly identified sub headers within the profile.	Met
FMAG1-b. Does the risk assessment provide an overview of the probability of future wildfire events that includes projected changes in the location, intensity, frequency and/or duration of wildfire hazards?	Please see Section 3; the whole section is specific to climate variability and potential climate change as it applies to ND. Additionally, Hazard Profiles are listed in section 4, and Wildfire is addressed in 4.2. Each hazard profile follows a standardized outline for ease of review. Location, Intensity, Frequency, and Duration is described for each of the natural hazards, and can be found in the "Future Conditions" subsection (page numbers will vary per hazard profile)	Met
FMAG1-c. Does the risk assessment address the vulnerability of state assets located in wildfire hazard areas and estimate the potential dollar losses to those assets?	Please see Wildfire Hazard Profile in Section 4.2. National Risk Index (NRI) data was used to project annual loss and exposure value dollar losses to a variety of state assets, for example, buildings and crops, to wildfires. Multiple Figures are throughout the hazard profile that summarize estimated losses to assets. 4.2.2.5 and Figure, 4.2-22	Met

Requirements	Location in Plan (section and/or page number)	Met / Not Met
FMAG1-d. Does the risk assessment include an overview and analysis of local governments' vulnerability to wildfires and the potential losses to vulnerable structures?	Please see Wildfire Hazard Profile in Section 4.2. National Risk Index (NRI) data was used to project annual loss and exposure value dollar losses to a variety of state assets, for example, buildings and crops, to wildfires. Multiple Figures are throughout the hazard profile that summarize estimated losses to assets.	Met
FMAG2. Does the plan's mitigation strategy contain wildfire-related mitigation initiatives? [44 CFR 201.4(c)(3); 44 CFR § 204.51(d)(2)]		
FMAG2-a. Does the mitigation strategy identify mitigation actions and activities to reduce the vulnerability of jurisdictions within the state as well as the vulnerability of state-owned assets as described in Elements S5 and S6?	Please see Section 6 subsection 6.3.4 2023-2028 Mitigation Actions (page 797 of 1807) – the chart includes a total of 24 mitigation actions targeted towards the Wildfire Hazard	Met
FMAG Required Revisions: Click or tap here to enter text.		

3. Enhanced State Mitigation Plan Regulation Checklist

ENHANCED STATE PREREQUISITES

Requirements	Location in Plan (section and/or page number)	Met / Not Met
E1. Does the enhanced plan include all elements of the standard state mitigation plan? [44 CFR § 201.5(b)]		
E1-a. Does the enhanced plan meet all the required elements of the standard state mitigation plan?	Please see references above.	Met
E2. Regarding HMA, is the state maintaining the capability to meet application time frames and submitting complete project applications? [44 CFR § 201.5(b)(2)(iii)(A)]		
E2-a. Are all applications complete and submitted by the end of each program's respective application period?	Please see Section 6, subsection 6.2.2.6 Grant Requirement Compliance (page 790 of 1807).	Met
E2-b. Are all applications entered into FEMA's electronic data systems (i.e., NEMIS, eGrants, and/or FEMA GO)?	Please see Section 6, subsection 6.2.2.2 State-Managed Project Review Process (page 786 of 1807).	Met
E2-c. Is a complete Minimum Criteria Checklist for Project Subapplicants or equivalent documentation prepared for all subapplications?	Please see Section 6, subsection6.2.2.2 State-Managed Project Review Process (page 786 of 1807) (Step 6 of NDDES's Review Process).	Met
E2-d. Are all applications determined to be complete by FEMA within 90 days of submittal or selection for further review, or after the first request for information response?	Please see Section 6, subsection 6.2.2.6 Grant Requirement Compliance (page 790 of 1807).	Met

Requirements	Location in Plan (section and/or page number)	Met / Not Met
E3. Regarding HMA, is the state maintaining the capability to prepare and submit accurate environmental reviews and benefit-cost analyses? [44 CFR § 201.5(b)(2)(iii)(B)]		
E3-a. Are all applications and amendments determined to be complete by FEMA within 90 days of submittal or selection for further review, or after the first request for information response, including all data requested by FEMA to support cost-effectiveness determinations and EHP compliance reviews?	Please see Section 6, subsection 6.2.2.6 Grant Requirement Compliance (page 790 of 1807) and subsection 6.2.2.7 Environmental Review and Benefit-Cost Analysis (page 791 of 1807).	Met
E4. Regarding HMA, is the state maintaining the capability to submit complete and accurate quarterly progress and financial reports on time? [44 CFR § 201.5(b)(2)(iii)(C)]		
E4-a. Are all progress reports complete and submitted on time?	Please see Section 6 subsection 6.2.2.8 Quarterly Progress and Financial Reports (page 792 of 1807).	Met
E4-b. Are all FFR SF-425s submitted on time?	Please see Section 6 subsection 6.2.2.8 Quarterly Progress and Financial Reports (page 792 of 1807).	Met
E4-c. Does the state consistently comply with the Financial Management Standard requirements described in 2 CFR §§ 200.300 to 200.309?	Please see Section 6 subsection 6.2.2.9 Project Completion Requirements (page 793 of 1807).	Met
E5. Regarding HMA, is the state maintaining the capability to complete HMA projects within established performance periods, including financial reconciliation? [44 CFR § 201.5(b)(2)(iii)(D)]		
E5-a. Is all work as part of HMA subawards completed by the end of the period of performance, as described in the HMA Guidance?	Please see Section 6 subsection 6.2.2.5 State-Managed Monitoring and Closeout (page 189 of 1807).	Met

Requirements	Location in Plan (section and/or page number)	Met / Not Met
E5-b. Have there been no major findings on the last single audit obtained by the state related to HMA programs?	Please see Section 6 subsection6.2.2.8 Quarterly Progress and Financial Reports (page 792 of 1807) and subsection 6.2.2.9 Project Completion Requirements (page 793 of 1807).	Met
E5-c. Are all grant closeout activities, including financial reconciliation, completed within 120 days from the end of the performance period as outlined in 2 CFR 200.344?	Please see Section 6 subsection 6.2.2.5 State-Managed Monitoring and Closeout (page 789 of 1807).	Met
E5-d. Have actual expenditures been documented and are they consistent with SF-424A or SF-424C?	Please see Section 6 subsection 6.2.2.8 Quarterly Progress and Financial Reports (page 792 of 1807) and subsection 6.2.2.9 Project Completion Requirements (page 793 of 1807).	Met
Enhanced State Prerequisites Required Revisions: Click or tap here to enter text.		

INTEGRATED PLANNING

Requirements	Location in Plan (section and/or page number)	Met / Not Met
E6. Does the plan demonstrate integration, to the extent practicable, with other state and/or regional planning initiatives and FEMA mitigation programs and initiatives? [44 CFR § 201.5(b)(1)]		
E6-a. Does the enhanced plan demonstrate integration with other state and/or regional planning initiatives?	Please see Section 5, subsection 5.3	Met
E6-b. Does the enhanced plan demonstrate integration of FEMA mitigation programs and initiatives?	Please see Section 5, subsection 5.2, Section 4.12.1.4.2 on page 22	Met

Integrated Planning Required Revisions: Click or tap here to enter text.

DEMONSTRATING COMMITMENT TO A COMPREHENSIVE STATE MITIGATION PROGRAM

Requirements	Location in Plan (section and/or page number)	Met / Not Met
E7. Does the state demonstrate commitment to a comprehensive mitigation program? [44 CFR §§ 201.3(c), 201.5(b)(4) and 201.6(d)]		
E7-a. Does the state demonstrate commitment to statewide programs, initiatives and plans that advance mitigation and resilience?	Please see Section 6 subsection 6.1.2, Goal 1, Objectives 1-3, and Goal 2, Objectives 1-5. Figure 5.1 at 5.3.1.1, pp. 3-7	Met
E7-b. Does the state demonstrate a commitment to mitigation training and capability building?	Please see Section 6 subsection 6.1.2, Goal 1, Objective 1.3. Mitigation Strategy, Section 6, pp.6-7	Met
E7-c. Does the state demonstrate a commitment to its mitigation planning responsibilities by helping local governments update and adopt their plans before they expire?	Please see Section 6 subsection 6.1.2, Goal 1, Objective 1.1, Mitigation Strategy, Section 6, pp.6-7 and Section 5.4, pp.56-57	Met
Demonstrating a Commitment to a Comprehensive State Mitigation Program Required Revisions: Click or tap here to enter text.		

EFFECTIVE USE OF EXISTING MITIGATION PROGRAMS TO ACHIEVE MITIGATION GOALS

Requirements	Location in Plan (section and/or page number)	Met / Not Met
E8. Is the state effectively using existing mitigation programs to achieve mitigation goals? [44 CFR §§ 201.5(a) and 201.5(b)(3)]		
E8-a. Does the state demonstrate and document the full and effective use of existing FEMA programs (if funding is available)?	Please see Section 5, subsection 5.3.2.	Met

Requirements	Location in Plan (section and/or page number)	Met / Not Met
E8-b. Does the state demonstrate and document the full and effective use of non-FEMA programs?	Please see Section 5, subsection 5.3.1.	Met
Effective Use of Existing Mitigation Programs to Achieve Mitigation Goals Required Revisions: Click or tap here to enter text.		

DOCUMENTATION OF THE STATE'S IMPLEMENTATION CAPABILITY

Requirements	Location in Plan (section and/or page number)	Met / Not Met
E9. Does the enhanced plan document capability to implement mitigation actions? [44 CFR §§ 201.5(b)(2)(i), 201.5(b)(2)(ii), and 201.5(b)(2)(iv)]		
E9-a. Does the enhanced plan describe the system to rank the mitigation measures according to established eligibility criteria, including a process to prioritize between funding programs, jurisdictions, and proposals that address different or multiple hazards?	Please see Section 6, subsection 6.3.3 Mitigation Action Identification and Prioritization Methodology (page 796 of 1807), subsection 6.3.5 Local Prioritization (page 842 of 1807), and subsection 6.2.2.1 Criteria for Funding Priorities (page 785 of 1807).	Met
E9-b. Does the enhanced plan describe how the state will assess the effectiveness of mitigation actions, mitigation the agencies that are involved as well as the timeline, and use the results to inform the mitigation strategy?	Please see Section 7, subsection 7.2.	Met
Documentation of the State's Implementation Capability Required Revisions: Click or tap here to enter text.		

4. Plan Assessment

The Plan Assessment comments can be used to help guide the ongoing maintenance and update of your mitigation plan.

Standard State Mitigation Plan Requirements

PLANNING PROCESS

Strengths

- All the materials for the plan process (agendas, surveys, sign-in sheets, invites, notes, etc.) included in the appendix provide transparency into the planning process. This information will also be useful for the State Hazard Mitigation Team in the next update to know how the previous process was carried out and have materials that can serve as templates.
- The plan includes comprehensive lists of participants and workshop summaries to effectively describe the extent stakeholders, partners, Threat and Hazard specific committees, and the State Hazard Mitigation Team worked together. It was great to see the diverse floodplain stakeholder involvement in the Technical Advisory Committee listed in the Planning Team Appendix.
- The North Dakota Department of Emergency Services clearly demonstrated strong relationships with other State agencies and partners throughout plan development. Community-wide input and engagement was clearly a priority for the planning team, and they effectively coordinated with partners and stakeholders to develop this plan. The outreach strategy included in Appendix B was comprehensive and outlined multiple great outreach strategies. The public survey had a solid response with 260 surveys completed.
- It is commendable the State got 102 public and private partners to participate in the plan update. Utilizing hazard specific committees to really dive into the Hazard Identification and Risk Assessment and get good feedback created strong hazard profiles.

Opportunities for Improvement

- As an overall comment on this plan, some of the dense, more technical material and long length made it difficult to follow. While it is great that the North Dakota Department of Emergency Services was detailed and thorough in developing this plan, we recommend for the next plan update to consider what truly needs to be included in the plan and to include supplementary information in appendices. For example, we recommend moving something like the history of the National Manufactured Housing Construction and Safety Standards Act to an appendix.
- The state should consider increasing the time for the public comment period to increase the opportunity for interested parties to contribute feedback. In the next plan update, please utilize additional ways to engage the public and gather comments on the draft plan.
- The executive summary indicates the planning process was expedited but doesn't clarify why. Additional narrative explaining the reasoning behind this and how an expedited planning process

impacted the plan development should have been included, along with details about how the next plan update will ensure adequate time for the planning process.

- In the next plan update, we recommend providing your State Hazard Mitigation Team more chances to review the Threat and Hazard Identification and Risk Assessment and then discuss mitigation actions. Providing more time for your State Hazard Mitigation Team to come up with mitigation action ideas, assess what actions want to be continued, and flesh out the details can only strengthen your mitigation strategy and actions.

HAZARD IDENTIFICATION AND RISK ASSESSMENT

Strengths

- The climate change analysis is thorough and detailed. It sets the State up well to understand current and future climate risks and identify mitigation efforts that reduce future hazard risk compounded by climate change.
- The considerations of socially vulnerable and underserved communities in each hazard profile were well executed. The *Background* section provided a general overview of socially vulnerable and underserved communities throughout the state while each natural hazard profile included additional narrative and engaging maps that dove into why certain communities were particularly vulnerable and identified generally where these communities live/work and where the hazard risk is highest.
- The call-out boxes from local mitigation plans and input from public meetings and community coffees interspersed throughout this section are a great way to integrate local plans into the State plan and showcase work being done locally in North Dakota.
- The natural hazard profiles included thorough information about cascading or secondary hazards as well as good examples of the range of observed and anticipated intensities (extent) of natural hazards. For instance, the extent examples included for the Severe Summer Weather sub hazards (tornado, hail, lightning, wind, etc.) are great examples for local hazard mitigation plans to use to describe extent.
- The plan includes a robust Flooding hazard profile with regard to the effect on life, health, property, economy, transportation, cultural and natural resources, etc. In particular, the Flooding hazard profile does an excellent job of including historic data on previous flood events and losses. It also includes a strong discussion on future projected changes in flood risk due to climate change.
- The *Ecology* section of each hazard profile includes a strong analysis of the State's natural environment and points out the threatened/endangered species in the State. Threatened/endangered species are not something we see typically addressed in State Hazard Mitigation Plans and their inclusion supports a mitigation strategy that considers conservation of natural landscapes and species protection.
- The *Environmental, Natural, and Cultural Resources* section in each hazard profile provided excellent detail on known vulnerabilities. The *Environmental, Natural, and Cultural Resources* section in the Drought hazard profile in particular demonstrates a good understanding of the Endangered Species Act listed species and vulnerabilities to ecosystems as well as agencies that

may be involved in wetlands management. This plan will be used as a best practice example of how to integrate environmental and historic preservation considerations into hazard mitigation plans.
- Despite North Dakota's relatively low risk to seismic hazards, the plan thoroughly addresses earthquake risk.

Opportunities for Improvement
- Half of the hazards profiled in this plan are non-natural. It is up to the State to decide what hazards it wants to include, and we understand that the Emergency Management Accreditation Program (EMAP) certification may require including man-made and technological hazards. However, including them takes away time, resources, and focus that could be spent on other aspects like the planning process or developing a more granular mitigation strategy. It complicates conversations with partners when blending in non-mitigation pieces into the planning process, and in streamlining the plan document itself for effective readability.
- The *Hazard Identification and Risk Assessment* section acknowledges data limitations for each hazard profile. In the next plan update, beyond recognizing these limitations, please identify how the State will help fill the data gap, e.g., mitigation actions focused on this challenge.
- Many of the figures and maps were small, difficult to read, and lacked narrative to contextualize and describe the displayed data. For example, Figure 4.2-11 in the Fire hazard profile titled *Vulnerable Populations when Exposed to Wildfire Risk* nicely overlays counties with a variety of vulnerable populations and wildfire risk, but making the maps larger would allow more detail to be added. For example, it would be helpful to include county names or specific percentages of populations in these counties rather than just above the local median.
- While the *Background* section provides an overview of all hazards, it is still important to ensure that individual hazard profiles have ample discussion to address the planning requirements. If too much information is captured in the high-level overview, it makes it difficult for the reader to fully digest the information if they must go back and forth between the background and hazard profiles. Please ensure data that supports the analyses for each hazard profile are included in the respective hazard profile in the next plan update.
- The North Dakota Risk Assessment MapService (NDRAM) Base Level Engineering (BLE) is discussed in the plan, but it would be useful to see a visual representation in the next plan update of the 100-year floodplain across the state using BLE in addition to the FEMA-mapped Special Flood Hazard Area (SFHA), especially since the FEMA SFHA contains many unmapped areas. Figure 4.1-16 *FEMA National Flood Hazard Data Availability by County in North Dakota* is an example of how this is done elsewhere in the plan.
- Including the magnitude of the flood events or the time-period for which the averages were calculated in Figure 4.1-26 *Number of Riverine Flood Events Annually by North Dakota County* would provide a clearer picture of annual flood events in the state.

STATE MITIGATION CAPABILITIES

Strengths

- This section provides a thorough overview of partners, programs, and funding capabilities and identifies changes since the last plan, implementation challenges, as well as suggested improvements. In the next plan update, please provide suggested improvements for all implementation challenges listed to demonstrate how the program can work to overcome particular challenges to best inform the mitigation strategy and actions.
- Figures 5.14, 5.15, and 5.16 showing *Current State Mitigation Funding Sources, Current Federal Mitigation Funding Sources (NDDES, NDFS, NDDWR, NDDOT)*, and *Potential Federal Mitigation Funding Sources* clearly summarize the current and potential State, FEMA, and other federal funding opportunities available to fund the implementation of mitigation actions in North Dakota. This will be valuable to local jurisdictions and State agencies when considering funding opportunities as well as provide a resource for potential funding sources for mitigation actions.

Opportunities for Improvement

- Section 5.3.4 discusses some of the challenges local communities face to fund mitigation projects, including local match, understanding what is eligible for local match, and costly studies and design prior to submitting an application. In the next plan update, it will be important to clearly detail how the State is supporting local communities to address these gaps.
- Since nature-based solutions are a new priority identified in this plan for the State, be sure that the next plan update includes an analysis of State capabilities specifically related to nature-based solutions. This could include agencies, staff, and programs that advance nature-based solutions with noted capabilities that were essential to implementing the nature-based mitigation actions identified in this plan update.

MITIGATION STRATEGY

Strengths

- The State Hazard Mitigation Team should be commended for putting in a high level of thought and intention into the goals and objectives for the plan. The objectives provide more detail for the goal implementation and enhance the connection of mitigation actions to the risk assessment.
- Including nature-based and climate adaptation solutions in the plan's goals is fantastic. The numerous identified mitigation actions that align with the four objectives outlined in the plan with respect to Goal 5 show the State is prioritizing nature-based solutions and considering climate change in their mitigation work.
- Breaking out the mitigation actions into themes (Planning and Regulatory Mitigation Actions, Structural and Infrastructure Mitigation Actions, Nature-Based Mitigation, Public Education, Technical Assistance, and Partnerships, and Other Mission Areas) is a great way to categorize mitigation actions and helps to identify and prioritize mitigation actions that address each theme. This will be a useful tool for the State Hazard Mitigation Team to utilize during the next plan update when considering mitigation action ideas and the status of previous mitigation actions.

- Replacing the previous plan's drought mitigation action, *Identify and implement drought mitigation strategies,* with more specific drought mitigation actions under each of the mitigation action themes shows the State is committed to comprehensively addressing drought.
- The summary of jurisdictional prioritization of local mitigation actions in the Local Mitigation Actions table in Appendix H.4 illustrates the connection between local government mitigation strategy prioritization and the State's Mitigation Strategy.

Opportunities for Improvement

- Stakeholders should ideally have more than one collaborative working session to create new mitigation actions. One working session is not much time to get up to speed on every hazard profile, review goals and objectives, review previous mitigation actions, and to identify and a build out new mitigation actions. Holding additional working sessions allows stakeholders to provide more input on ongoing mitigation actions, including additional details like identifying possible funding sources, lead agencies, priority level, and to connect them back to the mitigation strategy goals and objectives.
- Please identify a standard timeframe for the *Mitigation Strategy*, as the timeframe in the plan is unclear. Short-term actions are described as occurring in the next five years in one part of the plan and one to three years elsewhere.
- To improve the disaster resilience conversation in the plan, consider including development standards along with building codes and standards for Goal 3. The State could provide guidance to governments about how to address the built environment.
- The plan missed an opportunity to develop mitigation actions that address implementation challenges and suggested improvements to capabilities identified in Section 5. For example, "Support additional agencies in joining the Silver Jackets program" would be a way to improve capability and collaboration amongst State agencies.
- In the next plan update, including steps for implementation and integration of mitigation actions will provide additional detail for lead agencies. Some of the Planning and Regulatory Actions identified in the *Mitigation Strategy* do not include additional detail or discuss a plan to integrate them into local Hazard Mitigation Plans and other community plans. For example, action PR-7 doesn't detail how the North Dakota Forest Service will update the 13 currently outdated Community Wildfire Protection Plans, and PR-16 doesn't detail how the North Dakota Department of Emergency Services and North Dakota Department of Commerce will evaluate and promote local and tribal jurisdictions to adopt regulatory setbacks or other alternatives to reduce the risk of property loss in high-hazard areas. An example where the plan does provide additional detail about how to implement a planning and regulatory action is PR-20 Integrate mitigation plans with comprehensive plans, climate action plans, drought mitigation, and other resiliency initiatives. In the Status column, steps identified to implement PR-20 include offering interagency training, tabletop discussions, workshops, and exercise opportunities statewide.
- This plan should not only serve to identify planning gaps for future investments but also incorporate these plans into its framework. This integration ensures the plan not only identifies potential gaps but also outlines concrete mitigation actions for on-the-ground projects aimed at reducing risk. Mitigation actions outlined in the plan, particularly strategies addressing Repetitive

Loss (RL) and Severe Repetitive Loss (SRL) properties, are essential. However, their effectiveness could be significantly bolstered by direct investments, exemplified by initiatives like Flood Mitigation Assistance (FMA) applications to minimize RL and SRL properties.

LOCAL PLANNING COORDINATION AND CAPABILITY BUILDING

Strengths

- Kudos to the State for having all local hazard mitigation plans either approved or under development. The NDDES staff clearly work hard and effectively to implement a high-quality mitigation planning program, and to ensure communities and their residents have access to beneficial non-emergency Stafford Act funding.
- The plan demonstrates strong incorporation of local hazard mitigation plans by including detailed information reflecting changes in development, population demographics, and potential impacts of climate change. This level of incorporation and consideration of most vulnerable jurisdictions will be a valuable resource for local jurisdictions as they update their local hazard mitigation plans.
- The section *Conclusions on Local and Tribal Mitigation Capabilities* provides a good summary of local and Tribal strengths, weaknesses, and emerging capabilities in terms of hazard mitigation planning, and was informed by the 24 survey responses to the Local & Tribal Staff Survey. This survey is a great tool to engage with local and Tribal staff to identify how the State can best support capability building.

Opportunities for Improvement

- The section *Public Assistance (PA) Grant Program* lists suggestions for improvements to the program, including: "Provide additional training for application development and project management… develop, schedule, and conduct classes to train new reservist personnel for future State Presidential Disaster Declarations." Adding brief examples of the curriculum that will be taught to new reservists during training and to other personnel for application development and project management would strengthen this section. Also providing a time frame for establishing this training, if available, would demonstrate how soon this improvement will be made. The section could detail planned areas for effort expansion such as requesting training from FEMA for PA and IA officers.
- The section *Public Assistance (PA) Grant Program* states, "North Dakota is a PA managing state, meaning that the state is authorized to manage all aspects of PA field operations." This section could reference the document where more information can be found on how the 406 PA Mitigation Program is managed by the state of North Dakota.
- The section *Public Assistance (PA) Grant Program* lists implementation challenges, including: "The size of future disasters will most likely dictate the ability of the state to sustain state-managed aspects of PA field operations." Are there examples of how in the past the State has addressed such challenges?
- Figure 5.8 *Public Assistance Funding Received in North Dakota (1993 – 2023)* tracks the success of the PA Mitigation Program. We would like to see this further broken out by the percentage of PA Category C-G (permanent work) that was utilized on disaster declarations in the

next plan update. If data is available, an additional figure such as a pie chart would help demonstrate the percentage of Disaster Declarations (by hazard type) that utilized 406 PA Mitigation funding for PA Category C-G (permanent work).

REVIEW, EVALUATION, AND IMPLEMENTATION

Strengths

- It's clear that North Dakota is committed to pursuing an equitable approach to mitigation planning through their partnerships and Community Coffee engagements. We look forward to seeing how the North Dakota Department of Emergency Services and partners continue to build upon their inclusion and involvement of socially vulnerable and underserved or underrepresented groups in the planning process.
- The system and timing for reviewing progress on achieving the Mitigation Strategy's goals are well thought out and make sense to do ahead of the State's enhanced validation to ensure any discussion topics can be identified.

Opportunities for Improvement

- Please include more detail on how the plan will be integrated into additional planning mechanisms in the next plan update. There is ample evidence of strong partnerships throughout the plan, but the plan lacks detail in how it will be integrated and how other plans will be integrated into the plan assessment and update process. Consider including a schedule of the plan's annual review as well as other planning mechanisms' schedules for review and update to better highlight how and when plan integration happens or will happen.
- The plan notes the State Hazard Mitigation Team will meet annually to review the plan. Does this meeting happen at the same time each year? If so, please be sure to include that information in the next plan update to provide clarity on the annual review process.
- While the annual progress reports are mentioned and attached to this plan, in the next plan update, expand on the latest annual progress report to provide further insight to how the North Dakota Department of Emergency Services and the State Hazard Mitigation Team assess progress on the implementation of the plan.

ADOPTION AND ASSURANCES

Strengths

- FEMA Region 8 appreciates all the opportunities the North Dakota Department of Emergency Services provided us to engage on this plan throughout its development. We value our partnership with the State to advance mitigation in North Dakota and look forward to continued collaboration throughout this plan's lifecycle.
- FEMA Region 8 is pleased the Governor fully supports the 2024-2029 Enhanced Mitigation Mission Area Operations Plan and the State agencies that will implement the plan and mitigation actions. We look forward to seeing all the State will accomplish with this plan.

HIGH HAZARD POTENTIAL DAMS

Strengths

- The Dam Failure profile includes a strong overview of future conditions and does a good job of discussing cascading/secondary hazards. It is also great that the plan identifies dams in Montana that pose a risk to communities in North Dakota as natural hazards don't follow jurisdictional boundaries.
- The plan does a robust job profiling the dam failure hazard across the State and looking at multiple aspects of vulnerability, including vulnerable populations, cultural resources, critical infrastructure, and more.

Opportunities for Improvement

- Including inundation maps and additional details about emergency action plans, floodplain management plans, and other information and data would help refine the risk assessment. Additional information would provide more detail on involvement from the State Dam Safety Program and agency as well as other stakeholders in the planning process.
- A targeted discussion of local policies, programs, and capabilities specific to mitigating high hazard potential dams, including specific challenges and opportunities, will strengthen the *Dam Failure* hazard profile in the next plan update.

FIRE MANAGEMENT ASSISTANCE GRANTS

Strengths

- Despite never having had an FMAG declaration in the state, we are pleased to see the North Dakota Department of Emergency Services is prepared and has developed a framework should one be declared in the future.
- The *Fire* hazard profile includes great consideration of populations who are most vulnerable to fire risk, including underserved and socially vulnerable communities. The narrative provides robust analysis and context for the overlay maps which show fire risk and where vulnerable communities are located throughout the State. The vulnerability and impacts analysis to firefighters was well done.

Opportunities for Improvement

- The *Fire* hazard profile mentions the upcoming North Dakota Fire Needs Assessment Survey as a valuable resource for future conditions (and a data gap) but does not include it as an action in the *Mitigation Strategy*. In the next plan update or the annual mitigation report, consider including how this survey will be integrated and what data and information will be used to inform the next update or the annual mitigation report.

Enhanced State Mitigation Plan Requirements

ENHANCED STATE PREREQUISITES

Strengths

- As noted, the climate change content included in the plan is detailed, and each hazard profile provides a comprehensive analysis of future conditions, including a thorough discussion of impacts, adaptation, and mitigation. It will serve as a great resource for local communities as they incorporate climate change impacts into their hazard mitigation plan updates.
- The consideration of socially vulnerable and underserved communities throughout the plan is extensive. The risk assessment includes a detailed equity analysis focused on socially vulnerable and underserved communities in the *Background* section as well as in each natural hazard profile. The consideration of the whole community is reflected in the *Mitigation Strategy* and in various mitigation actions as well. The information on underserved and socially vulnerable communities will be key for informing updates to local hazard mitigation plans and demonstrates the State's commitment to equity in mitigation planning.

Opportunities for Improvement

- FEMA Region 8 recommends that the next plan improve the overall flow and readability of the plan by moving supplementary information to appendices.

INTEGRATED PLANNING

Strengths

- The integration with other State and regional planning initiatives is well documented in section 5.3.1.2 *Programs, Partnerships, and State Plans* with changes since the last plan update, implementation challenges, and suggested improvements to the program. This level of detail shows the State's commitment to the partnerships and programs they are involved with, allowing for strong evaluations of their strengths, weaknesses, changes, and potential improvements with each plan update.
- North Dakota coordinates a commendable network of programs and partners that it integrates with for planning initiatives, demonstrated by the inventory of programs, plans, outcomes, and the annual progress reports.

Opportunities for Improvement

- The *Plan Integration* appendix lists many State plans that were integrated into this plan update. It notes all of them were integrated into the *Hazard Identification and Risk Assessment* but doesn't indicate how these plans were integrated or what specific information from each plan informed the risk assessment. It is recommended in the next plan update to include (1) a deeper analysis of how the State's Enhanced Hazard Mitigation Plan will inform updates to other State plans, and (2) how other State plans were specifically used to inform the plan update. This will show the integrated planning efforts of the State in more detail and make plan integration more tangible, concrete and in unison across the whole of North Dakota's State government.

- Include suggested improvements for all areas where challenges to implementation exist in the next plan update. If there are no suggested improvements, please describe in greater detail the limitations and how the State will overcome barriers.

DEMONSTRATING A COMMITMENT TO A COMPREHENSIVE MITIGATION PROGRAM

Strengths

- The multiple trainings, technical assistance and touchpoints offered by the State like Plan Developers meetings, Community Coffees, G318 Local Mitigation Planning Workshops, IS-235 Emergency Planning Courses, etc., show that North Dakota is committed to a comprehensive mitigation program and is clearly working to create a strong mitigation program in the State. The State staff involved in this work do a fantastic job elevating the mitigation program by delivering and facilitating these trainings and engagements and by implementing a successful Program Administration by State Pilot Program.
- Having a staff member that is focused solely on engaging directly on climate change and impacts in the State demonstrates the State's intention to build up their climate change knowledge and skillsets while providing resources and technical assistance to local jurisdictions. This will help them meet the updated policy guidance dealing with climate change and underserved communities.
- The plan makes a good case for building capacity of State staff managing Benefit Cost Analyses through multiple trainings including E-276 Introduction to Benefit Cost Analysis and E-212 Unified Hazard Mitigation Assistance: Application Development.

Opportunities for Improvement

- Consider changing *Weaknesses of Local and Tribal Capabilities* to *Challenges to Local and Tribal Capabilities* in the next plan update. This shift in language implies that a challenge can be overcome while a weakness implies more permanence and intentional shortcomings.

EFFECTIVE USE OF EXISTING MITIGATION PROGRAMS TO ACHIEVE MITIGATION GOALS

Strengths

- Carrying out joint reviews of local hazard mitigation plans as part of the State's PAS program has been valuable to ensure local communities are creating robust hazard mitigation plans with meaningful and impactful mitigation actions.
- Similarly, we look forward to partnering with the State to support North Dakota communities' development of strong project applications for highly competitive FEMA programs.
- The section *Losses Avoided*, though not directly tied to the success of the 406 PA Mitigation program, shows the State of North Dakota is using methods such as Loss Avoidance Studies to evaluate the impacts that were prevented by completed mitigation projects.

Opportunities for Improvement

- In the next plan update, ensure the mitigation actions consider all identified potential funding sources in the plan. For example, the Natural Resources Conservation Service's Emergency

Watershed Protection Program is listed as a potential funding source in the *Capability Analysis* section but isn't listed as a potential funding source for 2023-2028 Mitigation Actions.

DOCUMENTATION OF THE STATE'S IMPLEMENTATION CAPABILITY

Strengths

- The North Dakota Department of Emergency Services' annual mitigation reports and Mitigation Matters articles in the agency newsletter are a fantastic way to uphold best practices, highlight mitigation partners, provide mitigation education, and annually monitor and evaluate implementation of mitigation actions. The detail provided in the annual reports provides a robust overview of progress and insights for mitigation actions.

Opportunities for Improvement

- Section 6.3.3 *Mitigation Action Identification and Prioritization* provides an overview of factors considered when determining prioritization of mitigation actions and Appendix G.2 *Mitigation Action Prioritization Analysis* shows how each mitigation action was evaluated using the STAPLEE method. Including an example in the main body of the plan showing how a mitigation action was ranked and prioritized will walk readers through how the methodology is utilized. This example can be used to show the State Hazard Mitigation Team how a mitigation action is prioritized, informing the identification and execution of each action.